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THE JOHNS HOPKINS UNIVERSITY FROM 1873 TO 1893.

By DANIEL C. GILMAN.

Twenty years having elapsed since the death of the founder the following historical statements may be of interest to the public.

Before speaking of the University, a few words should be devoted to the memory of its founder, Johns Hopkins, of Baltimore. This large-minded man, whose name is now renowned in the annals of American philanthropy, acquired his fortune by slow and sagacious methods. He was born May 19, 1794, in Anne Arundel county, Maryland, not far from the city of Annapolis, of a family which for several generations had adhered to the views of the Society of Friends. His ancestors were among the earliest settlers of the colony. While still a boy, Johns Hopkins came to Baltimore without any capital but good health, the thrifty habits in which he had been brought up, and unusual capacity for a life of industrious enterprise. He began on the lowest round of the ladder of fortune, and by his economy, fidelity, sagacity, and perseverance he rose to independence and influence. He was called to many positions of financial responsibility, among the most important being that of President of the Merchants' National Bank, and that of a Director in the Baltimore and Ohio Railroad Company. He was a man of positive opinions in political affairs, yet he never entered political life; and although he contributed to the support of educational and benevolent societies he was not active in their management. In the latter part of his life, he dwelt during the winter in a large mansion, still standing on the north side of Saratoga street, west of North Charles street, and during the summer on an estate called Clifton, in Baltimore county. In both these places he exercised hospitality without ostentation. He bought a large library and many oil paintings which are now preserved in memorial rooms at the Johns Hopkins Hospital. Nevertheless, his pursuits were wholly mercantile, and his time and strength were chiefly devoted to the business in which he was engaged,—first as a wholesale grocer, and afterwards as a capitalist interested in many and diverse financial undertakings. More than once, in time of commercial panic, he lent his credit to the support of individuals and firms, with a liberality which entitled him to general gratitude. He died in Baltimore, December 24, 1873, at the age of seventy-nine years. He had never married.

At the request of Mr. Hopkins, an incorporation was formed, August 24, 1867, under a general statute, "for the promotion of education in the State of Maryland." Nearly three years later, June 13, 1870, the Trustees met and elected Galloway Cheston, President of the Board, and William Hopkins, Secretary. On the death of the founder, it appeared that after providing for his near of kin, he had bequeathed the principal part of his estate to the two institutions that bear his name, the Johns Hopkins University and the Johns Hopkins Hospital. Each of them received an endowment estimated in round numbers at three and a half million dollars. The gift to the University included his estate of Clifton (three hundred and thirty acres of land), fifteen thousand shares of the common stock of the Baltimore and Ohio Railroad, of which the par value was one million five hundred thousand dollars, and other securities which were valued at seven hundred and fifty thousand dollars.

The Trustees met again February 6, 1874, and proceeded to the organization of the work entrusted to them. They collected a small but excellent library illustrating the history of the universities of this and of other lands; they visited in a body Cambridge, New Haven, Ithaca, Ann Arbor, Philadelphia, Charlottesville, and other seats of learning; they were favored with innumerable suggestions and recommendations from those who knew much about education, and from those who knew little. They invited several scholars of distinction to give them their counsel, among them three presidents of universities, Eliot of Harvard, White of Cornell, and Angell of Michigan, who answered in the frankest manner the searching questions which were put to them by a sagacious committee.

The original incorporators were these:

GEORGE W. DOBBIN,
GEORGE M. GILL,
ANDREW STERRETT RIDGELY,
THOMAS DONALDSON,
JAMES A. L. MCCLURE,
CHARLES J. M. GWINN,
THOMAS M. SMITH,
WILLIAM HOPKINS,
LEWIS N. HOPKINS,
JOHN W. GARRETT,
ALAN P. SMITH,
JOHN FONERDEN.

They elected the following Board of Trustees who had been selected by the founder:

Elected.		*Retired.*	*Elected.*		*Retired.*
1867	GEORGE WILLIAM BROWN	*1890	1867	LEWIS N. HOPKINS	
1867	GALLOWAY CHESTON	*1881	1867	WILLIAM HOPKINS	*1881
1867	GEORGE W. DOBBIN	*1891	1867	REVERDY JOHNSON, JR.	1880
1867	JOHN FONERDEN	*1870	1867	FRANCIS T. KING	*1891
1867	JOHN W. GARRETT	*1884	1867	THOMAS M. SMITH	*1877
1867	CHARLES J. M. GWINN		1867	FRANCIS WHITE	

As vacancies have arisen the following persons have become Trustees, by co-optation:

Elected.		*Elected.*	
1870	JAMES CAREY THOMAS.	1886	ROBERT GARRETT.
1878	C. MORTON STEWART.	1891	JAMES L. MCLANE.
1881	JOSEPH P. ELLIOTT.	1892	W. GRAHAM BOWDOIN.
1881	J. HALL PLEASANTS.	1892	WILLIAM T. DIXON.
1881	ALAN P. SMITH.		

On the thirtieth day of December, 1874, the Trustees elected Daniel C. Gilman, at that time President of the University of California, and formerly a Professor in Yale College, to be President of the Johns Hopkins University, and he entered upon the duties of this office in the following May.

In the summer of 1875, at the request of the Trustees, he went to Europe and conferred with many leaders of university education in Great Britain and on the continent. At the same time he visited many of the most important seats of learning. During the following winter the plans of the

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* Deceased.

University were formulated and were made public in an inaugural address by the President of the University, which was delivered on the twenty-second of February, 1876, in the Academy of Music.

In this address the aims of the University were thus defined: "An enduring foundation; a slow development; first local, then regional, then national influence; the most liberal promotion of all useful knowledge; the special provision of such departments as are elsewhere neglected in the country; a generous affiliation with all other institutions, avoiding interferences, and engaging in no rivalry; the encouragement of research; the promotion of young men, and the advancement of individual scholars, who by their excellence will advance the sciences they pursue, and the society where they dwell."

The agencies to be employed were enumerated in these words: "A large staff of teachers; abundance of instruments, apparatus, diagrams, books, and other means of research and instruction; good laboratories, with all the requisite facilities; accessory influences, coming both from Baltimore and Washington; funds so unrestricted, charter so free, schemes so elastic, that, as the world goes forward, our plans will be adjusted to its new requirements."

These aims and these agencies suggested the following method of procedure: "Liberal advanced instruction for those who want it; distinctive honors for those who win them; appointed courses for those who need them; special courses for those who can take no other; a combination of lectures, recitations, laboratory practice, field work and private instruction; the largest discretion allowed to the Faculty consistent with the purposes in view; and, finally, an appeal to the community to increase our means, to strengthen our hands, to supplement our deficiencies, and especially to surround our scholars with those social, domestic and religious influences which a corporation can at best imperfectly provide, but which may be abundantly enjoyed in the homes, the churches, and the private associations of an enlightened Christian city."

In accordance with these plans, the university was opened for students in October, 1876, in buildings provided at the corner of Howard and Little Ross streets. An opening address, having special relations to the anticipated school of medicine, in which the Hospital and the University were to be united, was delivered by Professor Huxley, of London.

One of the earliest duties which devolved upon the President and Trustees, after deciding upon the general scope of the University, was to select a staff of teachers by whose assistance and counsel the details of the plan should be worked out. It would hardly be right in this place to recall the distinctive merits of the able and learned scholars who have formed the academic staff during the first seventeen years, but perhaps the writer may be allowed to pay in passing a tribute of gratitude and respect to those who entered the service of the University at its beginning. To their suggestions, their enthusiasm, their learning, and above all their freedom from selfish aims and from petty jealousies, must be attributed in a great degree the early distinction of this institution. They came from widely distant places; they had been trained by widely different methods; they had widely different intellectual aptitudes; but their diversities were unified by their devotion to the university in which they were enlisted, and by their desire to promote its excellence. This spirit has continued till the present time, and has descended to those who have from time to time joined the ranks, so that it may be emphatically said that the union of the Faculty has been the key to its influence.

The first requisite of success in any institution is a body of professors, each of whom gives freely the best of which he is capable. The best varies with the individual; one may be an admirable lecturer or teacher; another a profound thinker; a third a keen investigator; another a skilful experimenter; the next a man of great acquisitions; one may excel by his industry, another by his enthusiasm, another by his learning, another by his genius; but every member of a faculty should be distinguished by some uncommon attainments and by some special aptitudes, while the faculty as a whole should be united and coöperative. Each professor, according to his subject and his talents, should have his own best mode of working, adjusted to and controlled by the exigencies of the institution with which he is associated.

In the selection of the faculty, the authorities endeavored to consider especially the devotion of the candidate to some particular line of study and the certainty of his eminence in that specialty; power to pursue independent and original investigation and to inspire the young with enthusiasm for study and research; willingness to coöperate in building up a new institution; and freedom from tendencies toward ecclesiastical or sectional controversies. They announced that they would not be governed by denominational or geographical considerations in the appointment of any teacher; but would endeavor to select the best person whose services they could secure in the position to be filled—irrespective of the place where he was born, or the college in which he was trained, or the religious body with which he might be enrolled.

In addition to the qualifications above mentioned, regard has always been paid to those personal characteristics which cannot be rigorously defined, but which cannot be overlooked if the ethical as well as the intellectual character of a professorial station is considered, and if the social relations of a teacher to his colleagues, his pupils, and their friends, are to be harmoniously maintained. The professor in a university teaches as much by his example as by his precepts.

The names of the professors in the philosophical faculty from 1876 to 1893 are as follows, arranged in the order of their appointment to that rank. Many of them were previously associate-professors, and not a few of them have gone forward through all the stages of advancement, fellows, associates, associate-professors and professors.

Appointed.			*Retired.*
1874	DANIEL C. GILMAN, LL. D.	*President*	
1876	BASIL L. GILDERSLEEVE, LL. D.	*Greek*	
1876	J. J. SYLVESTER, LL. D.	*Mathematics*	1883
1876	IRA REMSEN, Ph. D., LL. D.	*Chemistry*	
1876	HENRY A. ROWLAND, Ph. D.	*Physics*	
1876	H. NEWELL MARTIN, Sc. D.	*Biology*	1893
1876	CHARLES D. MORRIS, A. M.	*Classics (Collegiate)*	*1886
1883	PAUL HAUPT, Ph. D.	*Semitic Languages*	
1884	G. STANLEY HALL, LL. D.	*Psychology*	1888
1884	WILLIAM H. WELCH, M. D.	*Pathology*	
1884	SIMON NEWCOMB, LL. D	*Mathematics and Astronomy*	
1886	JOHN H. WRIGHT, A. M.	*Classical Philology*	1887
1889	EDWARD H. GRIFFIN, LL. D.	*History of Philosophy*	
1891	HERBERT B. ADAMS, Ph. D., LL. D.	*American and Inst. History*	
1891	WILLIAM K. BROOKS, Ph. D., LL. D.	*Zoölogy*	
1891	MAURICE BLOOMFIELD, Ph. D.	*Sanskrit and Comparative Philology*	
1892	THOMAS CRAIG, Ph. D.	*Pure Mathematics*	
1892	A. MARSHALL ELLIOTT, LL. D.	*Romance Languages*	
1892	HARMON N. MORSE, Ph. D.	*Analytical Chemistry*	
1892	MINTON WARREN, Ph. D.	*Latin*	
1892	GEORGE H. WILLIAMS, Ph. D.	*Inorganic Geology*	
1892	GEORGE H. EMMOTT, A. M.	*Roman Law, etc.*	
1892	HENRY WOOD, Ph. D.	*German*	
1892	FABIAN FRANKLIN, Ph. D.	*Mathematics*	
1892	EDWARD RENOUF, Ph. D.	*Chemistry (Collegiate)*	
1893	WILLIAM H. HOWELL, M. D., Ph. D.	*Physiology*	
1893	JAMES W. BRIGHT, Ph. D.	*English Philology*	
1893	WM. HAND BROWNE, M. D.	*English Literature*	
1893	HERBERT E. GREENE, Ph. D.	*English (Collegiate)*	

In the medical faculty, of which an account will be given on a subsequent page, the persons below named have been appointed professors:

Appointed.			*Retired.*
1883	H. NEWELL MARTIN, M. D.	*Physiology*	1893
1883	IRA REMSEN, M. D.	*Chemistry.*	
1884	WILLIAM H. WELCH, M. D.	*Pathology.*	
1889	WILLIAM OSLER, M. D.	*Medicine.*	
1889	HENRY M. HURD, M. D	*Psychiatry.*	
1889	HOWARD A. KELLY, M. D.	*Gynecology.*	
1889	WILLIAM S. HALSTED, M. D.	*Surgery.*	
1893	JOHN J. ABEL, M. D.	*Pharmacology.*	
1893	WILLIAM H. HOWELL, M. D.	*Physiology.*	
1893	FRANKLIN P. MALL, M. D.	*Anatomy.*	
1893	WILLIAM K. BROOKS, Ph. D.	*Zoology.*	

In addition to those who have become professors, the persons below named have held the office of associate professor, and their names are arranged in the order of their appointment:

Appointed.			*Retired.*
1883	CHARLES S. HASTINGS, Ph. D.	*Physics*	1883
1883	WILLIAM E. STORY, Ph. D.	*Mathematics*	1889
1884	J. RENDEL HARRIS, A. M.	*New Testament Greek*	1885
1887	RICHARD T. ELY, Ph. D.	*Political Economy*	1892
1888	WILLIAM T. COUNCILMAN, M. D.	*Anatomy*	1892
1888	ARTHUR L. KIMBALL, Ph. D.	*Physics*	1891
1888	EDWARD H. SPIEKER, Ph. D.	*Greek and Latin*	
1889	LOUIS DUNCAN, Ph. D.	*Electricity*	
1892	ETHAN A. ANDREWS, Ph. D.	*Biology*	
1892	WILLIAM B. CLARK, Ph. D.	*Organic Geology*	
1893	JOSEPH S. AMES, Ph. D.	*Physics*	
1893	MARION D. LEARNED, Ph. D.	*German*	
1893	KIRBY F. SMITH, Ph. D.	*Latin*	

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* Deceased.

The number of associates, readers, and assistants has been very large, most such appointments having been made for brief periods among young men of promise looking forward to preferment in this institution or elsewhere.

Besides the resident professors, it has been the policy of the University to enlist from time to time the services of distinguished scholars as lecturers on those subjects to which their studies have been particularly directed. During the first few years the number of such lecturers was larger, and the duration of their visits was longer than it has been recently. When the faculty was small, the need of the occasional lecturer was, for obvious reasons, more apparent than it has been in later days. Still the University continues to invite the coöperation of non-resident professors, and the proximity of Baltimore to Washington makes it particularly easy to engage learned gentlemen from the capital to give occasional lectures upon their favorite studies. Recently two lectureships have been established by donations, which will be mentioned in a later paragraph. A few of those who held the position of lecturers made Baltimore their home for such prolonged periods that they could not properly be called non-resident. These are indicated by an asterisk in the following list, which contains the principal appointments. It might be much enlarged by naming those persons who have lectured at the request of one department of the University and not of the Trustees, and by naming some who gave but single lectures.

Originally Appointed.		
1876	Simon Newcomb	*Astronomy.*
1876	Léonce Rabillon*	*French.*
1876	John S. Billings	*Medical History, etc.*
1876	Francis J. Child	*English Literature.*
1876	Thomas M. Cooley	*Law.*
1876	Julius E. Hilgard	*Geodetic Surveys.*
1876	James Russell Lowell	*Romance Literature.*
1876	John W. Mallet	*Technological Chemistry*
1876	Francis A. Walker	*Political Economy.*
1876	William D. Whitney	*Comparative Philology.*
1878	William F. Allen	*History.*
1878	William James	*Psychology.*
1878	George S. Morris*	*History of Philosophy.*
1879	J. Lewis Diman	*History.*
1879	H. Von Holst	*History.*
1879	William G. Farlow	*Botany.*
1879	J. Willard Gibbs	*Theoretical Mechanics.*
1879	Sidney Lanier*	*English Literature.*
1879	Charles S. Peirce*	*Logic.*
1880	John Trowbridge	*Physics.*
1881	A. Graham Bell	*Phonology.*
1881	S. P. Langley	*Physics.*
1881	John McCrady	*Biology.*
1881	James Bryce	*Political Science.*
1881	Edward A. Freeman	*History.*
1881	John J. Knox	*Banking.*
1882	Arthur Cayley	*Mathematics.*
1882	William W. Goodwin	*Plato.*
1882	G. Stanley Hall*	*Psychology.*
1882	Richard M. Venable	*Constitutional Law.*
1882	James A. Harrison	*Anglo-Saxon.*
1882	J. Rendel Harris*	*New Testament Greek.*
1883	George W. Cable	*English Literature.*
1883	William W. Story	*Michel Angelo.*
1883	Hiram Corson	*English Literature.*
1883	F. Seymour Haden	*Etchers and Etching.*
1884	William Trelease	*Botany.*
1884	J. Thacher Clarke	*Explorations in Assos.*
1884	Josiah Royce	*Philosophy.*
1884	William J. Stillman	*Archæology.*
1884	Charles Waldstein	*Archæology.*
1884	Sir William Thomson (Lord Kelvin)	*Molecular Dynamics.*
1885	A. Melville Bell	*Phonetics, etc.*
1885	Edmund Gosse	*English Literature.*
1885	Eugene Schuyler	*U. S. Diplomacy.*
1885	Justin Winsor	*Shakespeare.*
1885	Frederick Wedmore	*Modern Etchings.*
1886	Isaac H. Hall	*New Testament.*
1886	William Hayes Ward	*Assyria.*
1886	William Libbey, Jr	*Alaska.*
1886	Alfred R. Wallace	*Island Life.*
1886	Mandell Creighton	*Rise of European Universities.*
1887	Arthur L. Frothingham, Jr	*Babylonian and Assyrian Art.*
1887	Rodolfo Lanciani	*Roman Archæology.*
1888	Andrew D. White	*The French Revolution.*
1888	Elgin R. L. Gould*	*Social Statistics.*
1888	Woodrow Wilson*	*Science of Administration.*
1889	Amos G. Warner	*Charities.*
1890	John A. Broadus	*Origin of Christianity.*
1891	Edmund C. Stedman	*Nature and Elements of Poetry*
1891	David C. Bell	*Vocal Expression.*
1891	J. Franklin Jameson	*Constitutional History.*
1891	John A. Kasson	*History of Diplomacy.*
1891	George Lyman Kittredge	*The Gawain Romances.*
1891	Richard G. Moulton	*Milton's Poetic Art.*
1891	James Schouler*	*American Political History.*
1891	Caleb T. Winchester	*English Literature.*
1891	Carroll D. Wright	*Social Science.*
1892	Richard C. Jebb	*Greek Poetry.*
1892	William R. Harper	*Old Testament Scriptures.*
1892	Richard S. Storrs	*St. Bernard.*
1892	Oliver Elton	*English Literature.*
1892	Frederic Bancroft	*American Diplomatic History.*
1892	Albert Shaw	*Municipal Problems.*
1892	John Murray	*Voyage of the "Challenger."*
1892	Francis B. Gummere	*Ballad Poetry.*
1892	Henry C. Adams	*Finance.*
1892	John B. Clark	*Economics.*
1892	William T. Harris	*Pedagogics.*
1892	James MacAlister	*Pedagogics.*
1893	Robert Y. Tyrrell	*Latin Poetry.*
1893	William R. Huntington	*Christian Life.*

From the opening of the courses a distinction has been made between university and collegiate methods of instruction. The terms university and college have been so frequently interchanged in this country that their significance is liable to be confounded; and it may be worth while, once more at least, to call attention to the distinction which is here made.

The college is understood to be a place for the orderly training of youth in those elements of learning which should underlie all liberal and professional culture. The ordinary conclusion of a college course is the Bachelor's degree. Often, but not necessarily, the college provides for the ecclesiastical and religious as well as the intellectual training of its scholars. Its scheme admits but little choice. Frequent daily drill in languages, mathematics, and science, with compulsory attendance and repeated formal examinations, is the discipline to which each student is submitted. This work is simple, methodical, and comparatively inexpensive. It is understood and appreciated in every part of this country.

In the university more advanced and special instruction is given to those who have already received a college training or its equivalent, and who now desire to concentrate their attention upon special departments of learning and research. Libraries, laboratories, and apparatus require to be liberally provided and maintained. The holders of professorial chairs must be expected and encouraged to advance by positive researches the sciences to which they are devoted; and arrangements must be made in some way to publish and bring before the criticism of the world the results of such investigations. Primarily, instruction is the duty of the professor in a university as it is in a college; but university students should be so mature and so well trained as to exact from their teachers the most advanced instruction, and even to quicken and inspire by their appreciative responses the new investigations which their professors undertake. Such work is costly and complex; it varies with time, place, and teacher; it is always somewhat remote from popular sympathy, and liable to be depreciated by the ignorant and thoughtless. But it is by the influence of universities, with their comprehensive libraries, their costly instruments, their stimulating associations and helpful criticisms, and especially their great professors, indifferent to popular applause, superior to authoritative dicta, devoted to the discovery and revelation of truth, that knowledge has been promoted, and society released from the fetters of superstition and the trammels of ignorance, ever since the revival of letters.

In accordance with the plans thus formulated, the students have included those who have already taken an academic degree and have here engaged in advanced studies; those who have entered as candidates for the Bachelor's degree; and those who have pursued special courses without reference to degrees. The whole number of persons enrolled in these three classes, from the opening of the University to the end of the seventeenth academic year (June, 1893), is two thousand two hundred and forty-six. Nine hundred and forty-seven persons have pursued undergraduate courses and fifteen hundred and nineteen have followed graduate studies. Many of those who entered as undergraduates have continued as graduates, and have proceeded to the degree of Doctor of Philosophy. These students have come from nearly every State in the Union, and not a few of them have come from foreign lands. Many of those who received degrees before coming here were graduates of the principal institutions of this country. The degree of Doctor of Philosophy has been awarded after three years or more of graduate study to two hundred and seventy-seven persons, and that of Bachelor of Arts to three hundred and eighty-one persons at the end of their collegiate course.

Only these two degrees have been offered to the students of this University. Believing that the manifold forms in which the baccalaureate degree is conferred are confusing to the public, and that they tend to lessen the respect for academic titles, the authorities of the Johns Hopkins University determined to bestow upon all those who complete their collegiate courses the title of Bachelor of Arts. This degree is intended to indicate that its possessor has received a liberal education, or in other words that he has completed a prolonged and systematic course of studies in which languages, mathematics, sciences, history, and philosophy have been included. The amount of time devoted to each of these various subjects varies according to individual needs and preference, but all the combinations are supposed to be equally difficult and honorable. Seven such combinations or groups of studies have been definitely arranged, and "the group system," thus introduced, combines many of the advantages of the elective system, with many of the advantages of a fixed curriculum. The undergraduate has his choice among many different lines of study, but having made this determination he is expected to follow the sequence prescribed for him by his teachers. He may follow the old classical course; or he may give decided preference to mathematics and physics; or he may select a group of studies, antecedent to the studies of a medical school; or he may pursue a scientific course in which chemistry predominates; or he may lay a foundation for the profession of law by the study of history and political science; or he may give to modern languages the preference accorded in the first group to the ancient classics. In making his selection, and indeed in prosecuting the career of an undergraduate, he has the counsel of some member of the faculty who is called his adviser. While each course has its predominant studies, each comprises, in addition, the study of French and German, and at least one branch of science, usually chemistry or physics, with laboratory exercises.

The degree of Doctor of Philosophy is offered to those who continue their university studies for three years or more after having attained the baccalaureate degree. Their attention must be given to studies which are included in the faculty of philosophy and the liberal arts, and not in the professional faculties of Law, Medicine, and Theology. Students who have graduated in other institutions of repute may offer themselves as candidates for this degree. In addition to the requirements above mentioned, the student must show his proficiency in one principal subject and in two that are secondary, and must submit himself to rigid examinations, first written and then oral. He must also present a thesis which must receive the written approval of the special committee to which it may be referred, with the concurrence of the entire faculty, and must subsequently be printed. These requisitions are enforced by an academic body known as the Board of University Studies, which has prescribed the following regulations:—

> "A Board of University Studies is constituted for the purpose of guiding the work of those who may become candidates for this degree. The time of study is a period of at least three years of distinctive university work in the philosophical Faculty. It is desirable that the student accepted as a candidate should reside here continuously until his final examinations are passed, and he is required to spend the last year before he is graduated in definite courses of study at this University. Before he can be accepted as a candidate, he must satisfy the examiners that he has received a good collegiate education, that he has a reading knowledge of French and German, and that he has a good command of literary expression. He must also name his principal subject of study and the two subordinate subjects.
>
> The Board reserves the right to say in each case whether the antecedent training has been satisfactory, and, if any of the years of advanced work have been passed by the candidate away from this University, whether they may be regarded as spent in university studies under suitable guidance and favorable conditions. Such studies must have been pursued without serious distractions and under qualified teachers.
>
> Private study, or study pursued at a distance from libraries and laboratories and other facilities, will not be considered as equivalent to university study.
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> In the conditions which are stated below, it will appear that there are several tests of the proficiency of the candidate, in addition to the constant observation of his instructors. A carefully prepared thesis must be presented by the candidate on a subject approved by his chief adviser, and this thesis must receive the approbation of the Board. There are private examinations of the candidate, both in his chief subject and in the subordinate subjects. If these tests are successfully passed, there is a final oral examination in the presence of the Board."

As an indication of the possible combinations which may be made by those who are studying for the degree of Doctor of Philosophy, the following schedule is presented:

Physics, Mathematics, and Chemistry;
Animal Physiology, Animal Morphology, and Chemistry;
Chemistry, Mineralogy, and Geology;
Mathematics, Astronomy, and Physics;
Sanskrit, Greek, and Latin;
History, Political Economy, and International Law;
Greek, Sanskrit, and Latin;
French, Italian, and German;
Latin, Sanskrit, and Roman Law;
Latin, Sanskrit, and German;
Assyriology, Ethiopic and Arabic, and Greek;
Political Economy, History, and Administration;
English, German, and Old Norse;
Inorganic Geology and Petrography, Mineralogy, and Chemistry;
Geology, Chemistry, and Physics;
Romance Languages, German, and English;
Latin, Greek, and Sanskrit;
German, English, and Sanskrit.

Arrangements have recently been made for courses of instruction leading up to the degree of Doctor of Medicine, which will hereafter be conferred.

While students are encouraged to proceed to academic degrees, the authorities have always borne in mind the needs of those who could not, for one reason or another, remain in the university for more than a year or two, and who might wish to prosecute their studies in a particular direction without any reference to academic honors. Such students have always been welcome, especially those who have been mature enough to know their own requirements and to follow their chosen courses without the incentive of examinations and diplomas.

Much encouragement has been given to the publication of scientific journals and monographs. Six serials devoted to Mathematics, Chemistry, Philology, Biology, History, Assyriology have been published for several years with the financial support of the Trustees. A journal entitled Modern Language Notes has been maintained by the professors in that department of instruction. A monthly meteorological report and a weekly crop bulletin are published under the joint auspices of the State, the U. S. Weather Bureau, the University, and the Maryland Agricultural College. More than one hundred theses of those scholars who have graduated as Doctors of Philosophy have been printed. Occasional financial support has been given to other publications, among them the successive maps of the vicinity of Baltimore and of the geological structure of Maryland by Professors Williams and Clark; the repeated studies of the Oyster by Professor Brooks; the elaborate memoir on Salpa and other monographs by the same investigator; the maps of the Solar Spectrum by Professor Rowland, and his original investigation of the mechanical equivalent of heat; studies in logic by Mr. Charles S. Peirce and his scholars; essays in literature and philology by Professor Gildersleeve; an edition (facsimile) of the Teaching of the Apostles and a study of New Testament Autographs by Professor Harris; the Embryology of Insects and Arachnids by A. T. Bruce; a Chaldæan flood tablet, reconstructed and reproduced in facsimile by Professor Haupt; and a critical edition of the Hebrew Text of the Old Testament, also by Professor Haupt.

From the Johns Hopkins Hospital monthly bulletins and occasional reports are also issued.

Bibliographical summaries have been published exhibiting the writings of members of this university in Philology, Chemistry, Mineralogy and Geology.

Another form of intellectual activity is shown in the seminaries and scientific associations which have more or less of an official character. In the seminary, the professor engages with a small company of advanced students, in some line of investigation—the results of which, if found important, are often published. The relations of the head of a seminary to those whom he admits to this advanced work, are very close. The younger men have an opportunity of seeing the methods by which older men work. The sources of knowledge, the so-called authorities, are constantly examined. The drift of modern discussions is followed. Investigations, sometimes of a very special character, are carefully prosecuted. All this is done upon a plan, and with the incessant supervision of the director, upon whose learning, enthusiasm, and suggestiveness, the success of the seminary depends. Each such seminary among us has its own collection of books.

The associations or societies serve a different purpose. They bring together larger companies of professors and graduate students, who hear and discuss such papers as the members may present. These papers are not connected by one thread like those which come before the seminaries. They are usually of more general interest, and they often present the results of long continued thought and investigation.

The site selected when the University was opened in the heart of Baltimore, near the corner of Howard and Monument streets, has proved so convenient, that from time to time additional property in that neighborhood has been secured and the buildings thus purchased have either been modified so as to meet the academic needs, or have given place to new and commodious edifices.

The principal buildings are these:

(1). A central administration building, in which are the class-rooms for classical and oriental studies.

(2). A library building, in which are also rooms devoted especially to history and political science.

(3). A chemical laboratory, well equipped for the service of about one hundred and fifty workers.

(4). A biological laboratory, with excellent arrangements for physiological and morphological investigations.

(5). A physical laboratory—the latest and best of the laboratories—with excellent accommodations for physical research and instruction.

(6). A gymnasium for bodily exercise.

(7). Two dwelling houses, appropriated to the collections in mineralogy and geology until a suitable museum and laboratory can be constructed.

(8). Levering Hall, constructed for the uses of the Young Men's Christian Association, and containing a large hall which may be used for general purposes.

(9). Smaller buildings used for the smaller classes.

(10). An official residence of the President, which came to the University as a part of the bequest of the late John W. McCoy.

(11). McCoy Hall, now approaching completion.

The library of the university numbers nearly 62,000 well selected volumes, —including "the McCoy library" not yet incorporated with the other books, and numbering 8,000 volumes. Not far from 1,000 periodicals are received from every part of the civilized world. Quite near to the University is the Library of the Peabody Institute, a large, well-chosen, well-arranged, and well-catalogued collection. It numbers more than one hundred and twenty thousand volumes.

The university has extensive collections of minerals and fossils, a select zoölogical and botanical museum, a valuable collection of ancient coins, a remarkable collection of Egyptian antiquities (formed by Col. Mendes I. Cohen, of Baltimore), a bureau of maps and charts, a number of noteworthy autographs and literary manuscripts of modern date, and a large amount of the latest and best scientific apparatus—astronomical, physical, chemical, biological, pathological, and petrographical.

Medical science and medical education have been regarded as among the principal subjects to be considered by this University. This purpose was indicated by Johns Hopkins in the letter addressed by him to the Hospital Trustees, March 10, 1873, where he said to them:—"In all your arrangements in relation to this hospital, you will bear constantly in mind that it is my wish and purpose that the institution shall ultimately form a part of the Medical School of that University, for which I have made ample provision by my will." Accordingly, when the University was opened, ample provision was made for instruction in those studies which lead up naturally to the professional study of medicine. In addition to the courses in physics and chemistry, provision was made at that time for the study of biology, and a biological laboratory—the first of its kind in this country—was opened under the direction of well qualified instructors in comparative physiology and anatomy. But unforeseen delays in the completion of the hospital, and other considerations which need not be mentioned here, compelled a postponement of professional courses in the medical sciences, with the important exception of pathology. A professorship in this science was instituted in 1884, and was filled by the appointment of Dr. William H. Welch, and a pathological laboratory was opened, where facilities were afforded for the study of bacteriology. Many graduates in medicine availed themselves of these opportunities. Meanwhile much attention had been directed to the importance of medical education for women, and efforts had been made by committees of ladies in Baltimore and other cities to secure for this purpose an adequate endowment, to be connected with the foundations of Johns Hopkins. As the result of this movement, the Trustees accepted a gift from the committee of ladies, a sum which, with its accrued interest, amounted to $119,000, toward the endowment of a medical school to which "women should be admitted upon the same terms which may be prescribed for men.' This gift was made in October, 1890, but as it was inadequate for the purposes proposed, Miss Mary E. Garrett, in addition to her previous subscriptions, offered to the Trustees the sum of $306,977, which, with other available resources, made up the amount of $500,000, which had been agreed upon as the minimum endowment of the Johns Hopkins Medical School. These contributions enabled the Trustees to proceed with the organization of a school of medicine, which was opened to candidates for the degree of Doctor of Medicine in October, 1893. Those who have already received this degree are admitted also to advanced courses.

In addition to the gifts already mentioned, the University has received other important benefactions. When its income from the Baltimore and Ohio Railroad was cut off, Mr. William W. Spence proposed that a number of friends of the University should make up, by subscriptions of $5000 each, an emergency fund to be expended in maintaining the University in its normal efficiency. Some subscriptions of a less amount were received, and collectively the sum of $108,700 was presented to the Trustees in the spring of 1889.

About the same time Mr. Eugene Levering offered to construct a building for the use of the Young Men's Christian Association, at a cost of $20,000, and to maintain for a term of years a lectureship on subjects related to the work of that association.

Mr. and Mrs. Lawrence Turnbull proposed to endow a memorial lectureship of Poetry, with an income of $1000 per annum.

A short time afterwards, Mrs. Caroline Donovan, through the Mayor, Hon. Ferdinand C. Latrobe, gave to the University one hundred thousand dollars for the foundation of a chair of English literature.

Mr. John W. McCoy, by his last will and testament, presented to the University his large and costly collection of books and made the University his residuary legatee. From this estate more than two hundred thousand dollars (subject for some years to annuities) has been received, and a considerable part of this has been expended in the construction of McCoy Hall, —an academic structure, much needed by the classes in languages, history and philosophy.

In the year 1887, Mrs. Adam T. Bruce, of New York, gave the sum of $10,000 to found the Bruce Fellowship in memory of her son the late Adam T. Bruce, who had been a Fellow and an Instructor.

Recently, Mrs. William E. Woodyear has given the sum of $10,000 to found five scholarships as a memorial of her deceased husband.

Many noteworthy gifts have been received by the Library,—among them the library of the late Professor Bluntschli, of Heidelberg, presented in 1882 by the German citizens of Baltimore, and the Cohen collection of Egyptian Antiquities, partly purchased and partly given by the nephews of Colonel Mendes I. Cohen, by whom the objects were brought together. From the libraries of Drs. Christopher Johnston, Frank Donaldson, F. E Chatard, and J. H. Worthington, important medical books have been received; from the libraries of Charles J. M. Eaton, Reverdy Johnson, N. H. Morison, Nicholas Murray, and Charles D. Morris, many valuable historical and literary works were presented; and, besides these local gifts, some very acceptable books and manuscripts have been received from the libraries of Jared Sparks, George Ticknor, Francis Lieber, J. Caspar Bluntschli, Edouard Laboulaye,—gifts which, beyond their intrinsic merits, are valued for their association with the distinguished writers to whom they once belonged.

A few likenesses of departed members of the University have been given by their friends,—oil portraits of Johns Hopkins and Judge George William Brown, a bronze bust of Sidney Lanier, and a marble bust of Professor Charles D. Morris.

In conclusion, the following statistics may be recorded:—

Summary of Attendance, 1876–93.

Years.	Teachers.	Total Enrolled Students.	Graduates.	Matriculates.	Special.	Degrees Conferred	
						A. B.	Ph. D.
1876–77......	29	89	54	12	23	—	—
1877–78......	34	104	58	24	22	—	4
1878–79......	25	123	63	25	35	3	6
1879–80......	33	159	79	32	48	16	5
1880–81......	39	176	102	37	37	12	9
1881–82.....	43	175	99	45	31	15	9
1882–83......	41	204	125	49	30	10	6
1883–84......	49	249	159	53	37	23	15
1884–85......	52	290	174	69	47	9	13
1885–86......	49	314	184	96	34	31	17
1886–87......	51	378	228	108	42	24	20
1887–88.....	57	420	231	127	62	34	27
1888–89......	55	394	216	129	49	36	20
1889–90......	58	404	229	130	45	37	33
1890-91.....	66	468	276	141	51	50	28
1891–92......	65	547	337	140	70	41	37
1892–93......	72	551	347	133	71	40	28

Dated from the Johns Hopkins University, December 24, 1893,
twenty years from the death of its founder.

THE HERBARIUM AND LIBRARY OF CAPT. JOHN DONNELL SMITH.

By JOHN P. LOTSY, Ph. D., Associate in Botany, Johns Hopkins University.

Captain John Donnell Smith has, as stated in a previous *Circular*, opened his magnificent private herbarium and library to the students of botany of the Johns Hopkins University. This act of liberality cannot be too highly appreciated, as the herbarium is one of the largest and best selected private herbaria in existence, containing, as it does, many collections purchased in different parts of the world, and all the plants collected by Mr. Smith himself and his correspondents in Guatemala, and enumerated in his "Enumeratio Plantarum Guatemalensium," the third volume of which has just been published. The fact of its containing the originals of the new genera and species discovered by this enthusiastic investigator, and described in the careful manner for which he is well known, makes this collection one of unusual interest.

This is the most valuable part of the herbarium. It contains about 4,300 numbers, of which some six per cent are new species. In addition to its systematic value, this part of the herbarium is of special value to us, as it gives an insight into the geographical distribution of plants in an, as yet, very little known region, and by its bearing on the floras of Mexico and the West Indian Islands, it will, after having been worked up, throw much light on many obscure points. It is, therefore, a matter of congratulation to the members of the University, as well as to all enlightened Baltimoreans, that the collections of Mr. Donnell Smith will probably remain in our city, and not like Linnæus' celebrated herbarium be purchased by foreigners. Mr. Smith has indicated his intention, which he allows me here to express, of presenting both herbarium and library to the University so soon as a suitable building shall be offered for their reception and provision made for their maintenance in connection with a department for instruction and original work in botany.

This generous act should be received with enthusiasm by those who take a reasonable pride in the scientific advantages of our city.

The herbarium is preserved in a beautiful manner, all of its fine specimens having been poisoned to protect them from insects. They are fixed on extra-heavy half sheets in the manner of the Kew Herbarium, and the different species put together in stout tag-board genus covers, following the systematic sequence of Bentham and Hooker. The collection is put up in pigeon holes in walnut cases closed by glass doors.

80,000 sheets more or less are thus put up, in a manner which makes them readily accessible. The herbarium includes chiefly the Phanerogams and Vascular Cryptogams of the whole world but has also abundant representatives of Musci, Hepaticæ, Algæ, Lichenes and Fungi. It is especially rich in collections of North, Central, and South American plants.

In explanation of the importance of Capt. Smith's offer, I communicate the following details furnished by him in regard to both herbarium and library.

The Flora of the United States and of British America is represented with essential completeness, and chiefly by the following contributors in addition to Mr. Smith's own collections in each of the Southern States east of the Mississippi River:

Aiken.
Allen.
Austin.
Bailey
Bebb.
Boott.
Brainerd.
Brandegee.
Britton.
Brown.
Buckley.
Canby.
Chapman.
Chickering.
Collins.
Curtiss.
Cusick.
Dean.
Eaton.
Eggert.
Engelmann.
Faxon.
Fernald.
Garber.
Gattinger.
Greene.
Hale.
Hall.
Harvey.
Havard.
Heller.
Horsford.
Howell.
Hyams.
Jepson.
Jones.
Kearney.
Kellogg.
Kelsey.
Langlois.
Lemmon.
Lloyd.
Macoun.
McCarthy.
Martindale.
Mellichamp.
Mertz.
Miller.
Mohr.
Morong.
Oakes.
Palmer.
Parish.
Parry.
Patterson.
Porter.
Pringle.
Reverchon.
Reynolds.
Rose.
Rusby.
Sargent.
Sartwell.
Scribner.
Simpson.
Small.
Suksdorff.
Summers.
Tuckerman.
Underwood.
Vasey.
Wheeler.
Wolle.
Wright.

For Mexico and Central America we find the collections of:

Alfaro.
Bernouilli.
Botteri.
Bourgeau.
Cooper.
Fink.
Ghiesbreght.
Gómez.
Hart.
Heyde.
Kerber.
Liebmann.
Lux.
Palmer.
Parry.
Pittier.
Pringle.
Rovirosa.
Salvin.
Schaffner.
Schumann.
Shannon.
Donnell Smith.
Thieme.
Tonduz.
von Türckheim.
Wilkinson.
Zeladon.

Of West Indian plants we see those of:

Eggers.
Fendler.
Garber.
Hart.
Kruger.
Leefe.
Purdie.
Sherring.
Sintenis.
Wilson.
Wright.

South America is represented chiefly by some 3000 numbers of Lehmann, with 4000 more to follow; also by the distributions of:

Ball.
Bang.
Burchell.
Claussen.
Eggers.
Gardner.
Glazion.
Hall.
Im Thurn.
Jenman.
Kurz.
Morong.
Philippi.
Pohl.
Regnell.
Riedel.
Rusby.
Schomburgk.
Spruce.
Trask.
Triana.
Ule.
Widgreen.

For Europe we remark first of all the beautiful distribution of von Kerner (*Flora exsiccata Austro-Hungarica*), and among other series those of:

Bænitz.
Bennett.
Braun.
Glowacki.
Hegelmaier.
Henriquez.
Keck.
Kränzlin.
Mitten.
Rostan.
Schultz.
Welwitsch.

The African Flora is illustrated by sets of plants from:

Bolles.
Buchanan.
Cumming.
Last.
MacOwen.
Naumann.
Schimper.
Schweinfurth;

and by Hildebrandt's extensive series of Madagascar plants.

We observe from China the celebrated series of Henry, comprising over 5000 numbers, as well as plants from Custiss; from Thibet and Central Asia the Schlagintweit herbarium; from Syria the Post collections; from India a set of originals of Clark's descriptions in his volumes on the Flora of British India; and from other parts of Asia the collections of Duthie, Ferguson, Hope, Schweinfurth, Griffith, Helfer, Sir Wm. Norris, etc.

From Australia are collections made by Baron Mueller; from New Zealand and Queensland those of Kirke, Colenso and Cheeseman; from the Hawaian Islands those of Hildebrandt, Mann, Baldwin and Boyd; from the Philippine Islands those of Beale-Steere; from the Samoan Islands those of Powell; from Mauritius and the Seychelles those of Powell and Neville.

As many of the plants of the herbarium have been determined by the best authorities in the special families, it is needless to dwell upon its value from a systematic point of view, but also in a broader sense its value can hardly be overestimated.

It requires one with the experience of the teacher to appreciate properly the awkwardness and insufficiency of offering to students a mere list of names, on the one hand, and the inestimable value, on the other, of having the objects themselves for exhibition when describing the distribution of plants and in comparing the characters which fit them, for example, for a life in arid or in moist regions. Also in morphological and biological lectures the value is very apparent, of being able to show the plant we are talking about and thus leave an impression which a name never could make; especially is this true in the demonstration of metamorphoses.

How well do I remember, from my student days, that I could not grasp the idea of the roots of Iriartia ferox (a palm) being metamorphosed into thorns, serving as a protection to the stem, until I had seen part of such a stem on which all intermediate stages could be found.

It is a hard task for instance to impress on the student's mind the advantages which Platycerium grande derives from its creeping leaves if the plant cannot be shown; what a delight it is to see for the first time the albuminous globules on the leaves of the Cecropia, which the plant forms to keep the ants from destroying them.

How deep and lasting is the impression made by the actual sight of the fact that the gigantic flowers of the group of the Rafflesiaceae originate from a mycelium-like plant's body embedded in the wood of trees. Of course these things can be shown by diagrams, but the student is apt to think paper is patient, and it is easy for the instructor to draw what he wants us to see: if once seen, however, facts like those just mentioned are never forgotten.

The library of about 1,300 volumes, in bindings of the most ornamental character, contains most of the important works relating to systematic botany. We miss but few of those magnificent publications with which this science, above all other branches of natural history, has been so sumptuously illustrated. Special attention has been given to the acquisition of all books cited for descriptions or figures of plants of the New World. In fact, it may be stated that this library, supplemented by the less special serial publications to be found in that of the Peabody Institute, furnishes nearly every book needed for reference by the botanist, who may pursue in Baltimore the study of the North American, Mexican, Central American, West Indian or South American floras.

For the information of our students, who may have occasion to consult this library, a catalogue of abbreviated titles of its books is now published.

Adansonia.
Aiton, Hortus Kewensis.
Allen, Characeæ Americanæ.
André, Broméliacées.
Andrews, Botanist's Repository.
Annals of Botany.
Antoine, Atlas der Bromeliaceen.
Aublet, Histoire des Plantes de la Guyane Françoise.
Austin, Hepaticæ Boreali-Americanæ.
" Musci Appalachiani and Supplement.
Baillon, Dictionnaire de Botanique.
" Histoire des Plantes.
Baker, Flora of Mauritius and the Seychelles.
" Handbook of the Amaryllideæ.
" " " Bromeliaceæ.
" " " Fern-Allies.
" Revision of Liliaceæ.
" Summary of New Ferns.
" Synopsis Filicum.
Barbey, Études Botaniques.
" Epilobium Genus.
Barton, Medical Botany of the U. S.
" Floræ Philadelphicæ Prodromus.
Beck's Botany of the U. S.
Beddome, Ferns of British India.
Beer, Die Familie der Bromeliaceen.
Bentham, Botany of the Voyage of the Sulphur.
" British Flora.
" Flora Hongkongensis.
" Labiatarum Genera et Species.
" Plantæ Hartwegianæ.
" Revision of Mimoseæ and Cassia.
Bentham and Hooker, Genera Plantarum.
Bentham and Müller, Flora Australiensis.
Berg, Revisio Myrtacearum Americanarum.
Berkeley, Cryptogamic Botany.
Bertoloni, Florula Guatemalensis.
Bessey, Botany.
Böckeler, Die Cyperaceen des Königl. Herb. zu Berlin.
Boissier, Flora Orientalis.
" Icones Euphorbiarum.
Bonplandia.
Boott, Illustrations of the Genus Carex.
Botanical Miscellanies.
Botanisches Centralblatt.
Botany of the U. S. Exploring Expedition.
Britten, Journal of Botany.
Brown (Robert), Botanical Works.
Browne, Natural History of Jamaica.
Bulletin de l'Herbier Boissier.
Bureau, La Famille des Loganiacées.
" Monographie des Bignoniacées.
Burman, Plumieri Plantæ Americanæ.
Candolle, Introduction à l'Étude de la Botanique.
" La Phytographie.
" Lois de la Nomenclature Botanique.
" L'Origine des Plantes Cultivées.
" Mémoire sur la Famille des Anonacées.
" " " " Cactées.
" " " " Campanulées.
" " " " Combrétacées.
" " " " Composées.
" " " " Crassulacées.
" " " " Légumineuses.
" " " " Loranthacées.
" " " " Lythrariées.
" " " " Mélastomacées.
" " " " Ombellifères.
" " " " Onagraires.
" " " " Paronychiées.
" " " " Pipéracées.
" " " " Valérianées.
" Monographiæ Phanerogamarum.
" Nouvelles Recherches sur les Pipéracées.
" Plantarum Succulentarum Historia.
" Prodromus Systematis Naturalis Regni Vegetabilis.
Cavanilles, Dissertatio Botanica.
" Icones Plantarum.
Chapman, Flora of the Southern States and Supplement.
Choisy, De Convolvulaceis.
" Mémoire sur les Ternstrœmiacées et Caméliacées.
Contributions from the Gray Herbarium of Harvard University.
Contributions from the Herbarium of Columbia College.
Contributions from the U. S. National Herbarium.
Cooke, Manual of Botanical Terms.
Crozier, Dictionary of Botanical Terms.
Curtis, The Botanical Magazine.
Darby, Botany of the Southern States.
Darlington, Florula Cestrica.
Deniker, Atlas Manuel de Botanique.
Desfontaines, Choix des Plantes, &c.
Don, System of Botany.
Dumortier, Hepaticæ Europæ.
Durand, Index Generum Phanerogamorum.
Durand et Pittier, Primitiæ Floræ Costaricensis.
Eaton, Ferns of North America.
" Ferns of the Southwest.
Eaton and Wright, North American Botany.
Edwards, Botanical Register.
Edwards, Les Solanacées.
Eichler, Blüthendiagramme.
" Morphologie und Systematik der Marantaceen.
Endlicher, Genera Plantarum.
" Iconographia Generum Plantarum.
Engelmann, Botanical Works.
Engler, Botanische Jahrbücher.
" Araceæ Illustratæ.
Engler and Prantl, Die natürlichen Pflanzenfamilien.
Erythea.
Farlow, Gymnosporangia of the U. S.
Fée, Mémoires sur la Famille des Fougères.
Fée et Glaziou, Cryptogames vasculaires du Brésil.
Figuier, Histoire des Plantes.
Flora Brasiliensis. (32 folio vols. completed, others to be completed.)
Focke, Batographische Abhandlungen.
Fournier, Mexicanarum Plantarum Enumeratio.
Gærtner, De Fructibus et Seminibus Plantarum.
Gartenflora.
Goebel, Outlines of Classification and Morphology of Plants.
Gordon, The Pinetum.
Gottsche, Synopsis Hepaticarum.
Gray, Botanical Contributions.
" Text-book of Structural Botany.

Gray, Genera Floræ Americae Boreali-Orientalis Illustrata.
" Plantæ Fendlerianæ.
" Plantæ Wrightianæ.
" Plates of Forest Trees of North America.
" Revised Manual of Botany.
" Synoptical Flora of North America.
Greene, Illustrations of North American Oaks.
Grisebach, Catalogus Plantarum Cubensium.
" Erläuterungen ausgewählter Pflanzen des tropischen Amerika.
" Flora of the British West India Islands.
" Symbolæ ad Floram Argentinam.
" Vegetation der Karaiben.
Hanstein, Die Gesneraceen des königl. Herbariums zu Berlin.
Harvey, Flora Capensis.
Hegelmaier, Die Lemnaceen.
" Monographie der Gattung Callitriche.
Hemsley, Botany in Biologia Centrali-Americana.
Henschen, Études sur le Genre Peperomia.
Henslow, Dictionary of Botanical Terms.
Herbert, Amaryllidaceæ.
Hervey, Sea Mosses.
Hooker, Botanical Miscellany.
" British Ferns.
" Centuries of Ferns, I and II.
" Exotic Flora.
" Filices Exoticæ.
" Flora of the British Islands.
" Flora of British India.
" Flora of New Zealand.
" Genera Filicum.
" Icones Plantarum.
" Journal of Botany.
" Kew Garden Miscellany.
" London Journal of Botany.
Hooker and Arnott, Botany of Captain Beechey's Voyage.
Hooker and Bentham, Niger Flora.
Hooker and Greville, Icones Filicum.
Horaninow, Prodromus Monographiae Scitaminearum.
Humboldt and Bonpland, Monographia Melastomacearum.
Humboldt and Bonpland, Plantæ Æquinoctiales.
Humboldt, Bonpland and Kunth, Nova Genera et Species Plantarum.
Humboldt and Kunth, Distribution méthodique de la fam. des Graminées.
Jackson, Guide to the Literature of Botany.
" Index Kewensis.
Jacquin, Descript. et Icon. Plant. Rariorum Horti Schœnbrunnensis.
" Eclogæ Plantarum Rariorum.
" Observationum Botanicarum, etc.
" Oxalis.
" Selectarum Stirpium Amer. Historia.
Jahrbuch des Botan. Gartens zu Berlin.
Journal of the Linnean Society.
Jussieu, Genera Plantarum.
" Monographie des Malpighiacées.
Just's Botanischer Jahresbericht.
Karsten, Flora Columbiana.
" Gewächse Venezuelas.
Kaulfuss, Enumeratio Filicum.
Kerchove, Les Palmiers.
Kerner, Schedæ ad Floram exsiccat. Austro-Hungaricam.
Kew Bulletin.
Kew Determinations of Henry's Chinese Plants.
Kiærskou, Myrtaceæ ex India Occidentali.
King, Indo-Malayan and Chinese Species of Ficus.
Klatt, Neue Compositen im Herbar Frankeville.
Klotzsch, Begoniaceen-Gattungen und Arten.
Knowles and Westcott, Floral Cabinet.
Koch, Synopsis Floræ Germanicæ et Helveticæ.
Körnicke, Monographiæ Marantearum Prodromus.
Kuhn, Beiträge zur Mexicanischen Farrnflora.
Kunth, Enumeratio Plantarum.
" Synopsis Plant. Æquinoct. Orbis Novi.
Kuntze, Monographie der Gattung Clematis.
" Revisio Generum Plantarum.
Kunze, Analecta Pteridographica.
" Die Farrnkräuter.
La Llave et Lexarca, Novorum Vegetabilium Descript.
La Marck, Encyclopédie Botanique.
Lange, Flora Hispanica illustrata.
De Laroche, Eryngiorum Historia.
Lavallée, Les Clématites à grandes fleures.
Lecoyer, Monographie du Genre Thalictrum.
Lemaire, Flore des Serres et Jardins de l'Europe.
Le Maout and Decaisne, Descriptive and Analytical Botany.
Lesquereux and James, Mosses of North America.
De Lessert, Icones Plantarum Selectarum.
Lessing, Synopsis Generum Compositarum.
L'Heritier, Stirpes Novæ.
Liebmann, Chênes de l'Amérique tropicale.
" Mexicos Bregner, Halvgraes, &c.
Linden and Planchon, Plantæ Columbianæ.
Link and Otto, Icones Plant. Selectarum Horti Reg. Botan. Berol.
Link, Klotzsch and Otto, Icones Plant. Rariorum Horti Reg. Botan. Berol.
Linnæa.
Linnæus, Amoenitates academicæ.
" Critica botanica.
" Fundamenta botanica.
" Mantissa plantarum.
" Philosophia botanica.
" Species plantarum (curante Willdenow).
Loddige, Botanical Cabinet.
Loudon, Arboretum et Fruticetum Britannicum.
Lowe, Ferns: British and Exotic.
Lunan, Hortus Jamaicensis.
Macfadyen, Flora of Jamaica.
Macoun, Catalogue of Canadian Plants.
Martens and Galeotti, Fougères du Mexique.
" " " Enumeratio synopt. Plantarum Mexicanarum.
Martius, Icones Plantarum cryptogamicarum Brasiliensium.
" Nova Genera et Species Plantarum Brasiliensium.
Martyn, Plates of Plants.
Masters, Passifloraceæ.
Maund, Botanic Garden.
Mettenius, Ueber einige Farngattungen.
" Filices Chilenses ac Peruvianæ.
" Filices Horti Botanici Lipsiensis.
Meyer, Plantarum Surinamensium Corollarium Primum.
Meyer, Primitiæ Floræ Esequeboensis.
Michaux, Flora Boreali-Americana.
Michaux and Nuttall, The North American Sylva.
Micheli, Contributions à la Flore du Paraguay.
Miers, Apocynaceæ of South America.
" Contributions to Botany, iconographic and descriptive.
" Hippocrateaceæ of South America.
" Illustrations of South American Plants.
" On the Lecythidaceæ.
Miquel, Stirpes Surinamenses Selectæ.
" Symbolæ ad Floram Surinamensem.
Miller, Figures of Plants.
Moore, Index Filicum.
Moricand, Plantes Nouvelles d'Amérique.
Morren, Belgique Horticole.
Muhlenberg, Gramines Americæ Septentrionalis.
Naudin, Melastomacearum Monographica Descriptio.
Nees, Genera Plantarum Floræ Germanicæ Iconibus et Descriptionibus illustrata.
Nuttall, Genera of North American Plants.
Nyman, Conspectus Floræ Europææ.
Œrsted, Centralamericas Gesneraceer.
" L'Amérique Centrale.
" Præcursores Floræ Centroamericanæ.
" Symbolæ ad Floram Centro-Americanam.
Oliver, Flora of Tropical Africa.
" The Vegetable Kingdom.
Ortega, Descriptionum Decades.
Pallas, Illustrationes Plantarum.
Patterson, Check List of North American Plants.
Paxton, Magazine of Botany.
" Flower Garden.
Persoon, Synopsis Plantarum.
Philippi, Catalogus Plantarum vascularium Chilensium.
" Catalogus Prævius Plantarum in itinere ad Tarapaca lectarum.
Pierre, Sapotacées.
Pittonia.
Planchon and Triana, Mémoire sur les Guttifères.
Plumier, see Burman.
Poeppig and Endlicher, Nova Genera et Species Plantarum Chilens. Peruv. et Amazon.
Pohl, Icones et Descriptiones Plant. Brasiliensium.
Polakowsky, Die Pflanzenwelt von Costa Rica.
Porcher, Useful Plants of the Confederate States.
Porter, Botany of Colorado.
Prantl, Arbeiten aus dem Königl. Botan. Garten zu Breslau.
Presl, Epimeliæ Botanicæ.
" Hymenophyllaceæ.
" Reliquiæ Hænkeanæ.
" Tentamen Pteridographiæ.
" Supplementum Tentaminis Pteridographiæ.
Pritzel, Iconum Botanicarum Index locupletissimus.
" Thesaurus Literaturæ Botanicæ.
Pursh, Flora Americæ Septentrionalis.

Rabenhorst, Flora Europaea Algarum.
Raddius, Filices Brasilienses.
Radlkofer, Monographie der Gattung Serjania.
Ralf, Icones Carpologicæ.
Rafinesque, Flora Ludoviciana.
Regel, Descriptiones Plantarum novarum et minus cognitarum.
Reliquiæ Houstonianæ.
Revue Horticole.
Richter, Codex Linnaeanus Botanicus.
Roscoe, Monandrian Plants.
Rothrock, Botany of the Wheeler Survey.
Rotböll, Icones Plantarum Rariorum.
Rudge, Plantarum Guianæ Icones et Descriptiones.
Ruiz and Pavon, Floræ Peruvianæ et Chilensis Prodromus.
" " " Nova Genera et Species Floræ Peruv. et Chilens.
Sachs, Text-Book of Botany.
De La Sagra, Flora Cubana.
Salomon, Nomenclator der Gefässcryptogamen.
Sargent, Sylva of North America.
Saunders, Refugium Botanicum.
Sauvalle, Flora Cubana.
Schimper, Bryologia Europæa.
" Synopsis Muscorum.
Schkuhr, Naturgeschichte der Riedgräser.
Schlechtendahl and Chamisso, Plantarum Mexicanarum Recensio.
Schott, Genera Aroidearum.
Schnitzlein, Iconographia Familiarum Natural. Regni Vegetabilis.
Schreber, Beschreibung der Gräser.
Schweinfurth, Beiträge zur Flora Æthiopiens.
Seeman, Botany of the Voyage of the Herald.
" Journal of Botany.
Sitzungsberichte der Königl. Bayer. Akad. der Wissenschaften.
Smith, Enumeratio Plantarum Guatemalensium quas edidit John Donnell Smith, novarum additis descriptionibus et iconibus.
Smith, Historia Filicum.
Sprengel, Species Umbelliferarum minus cognitæ.
Spring, Monographie des Lycopodiacées.
St. Hilaire, Plantes Usuelles des Brasiliens.
Steudel, Nomenclator Botanicus.
Sullivant, Icones Muscorum.
Swartz, Flora Indiæ Occidentalis.
" Icones Plantarum Indiæ Occidentalis.
" Observationes Botanicæ.
" Synopsis Filicum.
Torrey, Flora of the State of New York.
Torrey, Monograph of North American Cyperaceæ.
Torrey and Gray, Flora of North America.
Torrey Botanical Club, Bulletin.
" " Memoirs.
Trelease, North American Geraniaceæ.
Triana, Melastomacées.
Triana and Planchon, Prodromus Floræ Novo-Granatensis.
Tuckerman, Synopsis of North American Lichens.
Tulasne, Légumineuses arborescentes de l'Amérique du Sud.
" Monographia Monimiacearum.
Turczaninow, Animadversiones ad Herbarium Turczaninowianum.
Underwood, Hepaticæ of North America.
Urban, Additamenta ad Cognitionem Floræ Indiæ Occident.
" Die Turneraceen.
Van Géel, Sertum Botanicum.
Vasey, Grasses of the Pacific Slope.
" Grasses of the Southwest.
Vellozo, Flora Fluminensis.
Ventenat, Jardin de Cels.
" Jardin de la Malmaison.
Verhandlungen des Botan. Vereins Brandenburg.
Walpers, Annales Botanices Systematicæ.
" Repertorium Botanices Systematicæ.
Warming, Symbolæ ad Floram Brasiliensem.
Weddell, Chloris Andina.
" Monographie des Urticacées.
Wilson, Bryologia Britannica.
Wolle, Desmids of the U. S.
" Fresh-Water Algæ of the U. S.
Wood, Class-Book of Botany.
" Fresh-Water Algæ of the U. S.
Watson, Bibliographical Index to N. A. Botany.
" Botany of California.
" Botany of Utah and Nevada.
" Contributions to N. A. Botany.
Zuccarini, Monographie der amerikanischen Oxalis-Arten.

I hope I have shown the great value of Mr. Smith's herbarium and library to the University, and, with my hearty thanks for his munificent offer, I can only express my earnest hope that the University will soon be enabled to accept the offer and make use of this opportunity to obtain such an addition to her resources for research and teaching, and my assurance that Baltimore will not allow such a treasure to leave her walls.

CURRENT NOTES.

The Eighteenth Academic Year began Monday, October 2, 1893. The opening assembly was held in Levering Hall at eight o'clock on the evening of Wednesday, October 4. Brief addresses were made by Professor Klein, of the University of Göttingen, Professor Newcomb, Professor Bloomfield, and Professor Howell.

The Autumn Examinations for admission and matriculation were held October 2, 3, and 4.

The Thanksgiving Recess extended from Wednesday evening, November 29 to Monday morning, December 4.

The Christmas Recess extended from the close of Friday, December 22, 1893, to the morning of Wednesday, January 3, 1894.

The Easter Recess will begin on Thursday morning, March 22, 1894. Classes will be resumed on Thursday morning, March 29.

Professor Norton's lectures on "Dante," on the Percy Turnbull Memorial Foundation, will be given March 29, 30, April 2, 4, 6, 9.

The Levering Lectures by President Hill, of the University of Rochester, will be given March 15, 16, 19, 20. His subject will be "Religion in the Light of Science."

Dr. S. Weir Mitchell lectured on "The Spirit of the Elizabethan Age in relation to its Drama," Wednesday, January 17, at 8 p. m. On Thursday, January 18, he spoke at the Johns Hopkins Hospital on "The Use and Abuse of Rest."

The Graduate Students' Association gave a reception in Levering Hall, on Wednesday evening, January 17.

Professor H. E. Greene gave an introductory lecture on "The Collegiate Study of English," in Levering Hall, Wednesday, January 10.

Professor T. C. Mendenhall, Superintendent of the U. S. Coast and Geodetic Survey, and Professor Bloomfield will give the principal addresses on Commemoration Day, Thursday, February 22.

Rev. Father Kenelm Vaughan, of England, gave an account of his prolonged work as a missionary in South America—from Panama to Patagonia,—in Levering Hall, December 11.

A public meeting of clergymen and others interested in the promotion of "Church Unity" was held in Levering Hall, December 14, when an address was delivered by Professor C. W. Shields, D. D., of Princeton College.

On January 18th, a recent photograph and a statuette in Parian marble of Miss Florence Nightingale were presented to the Nurses' Home of the Johns Hopkins Hospital. The statuette was given by Henry Bonham Carter, Esq., of London, whose sister modelled the figure about 1860, soon after the close of the Crimean war. It, therefore, represents Miss Nightingale at the time of her most remarkable achievements. The photograph was taken in 1892, at the instance of Miss Nightingale's brother-in-law, Sir Harry Verney, and by him it was presented to the Hospital.

A course of Lectures on Education, designed for the graduate students and others who expect to be teachers in higher institutions, is in progress on Saturday mornings at a quarter past nine o'clock, in the Physical Laboratory.

No. I-II of the Twelfth Series (1894) of the Studies in History and Politics is now ready. It contains a paper on The Cincinnati Southern Railway, a Study in Municipal Activity, by J. H. Hollander, and a Memorial of the late Lucius S. Merriam, Ph. D. (J. H. U., 1893), by Mr. Hollander, Professor Adams, Professor Bemis, and others.

SIXTH ANNUAL EXCURSION OF THE GEOLOGICAL DEPARTMENT, MAY 29—JUNE 5, 1893.

By GEORGE H. WILLIAMS.

During the past six years extended expeditions have been conducted to the remoter parts of Maryland and adjoining states for the purpose of acquainting students of geology with the formations of these regions. The very typical and diversified character of Maryland's structure and physical geography has often been emphasized, and detailed accounts of earlier excursions have from time to time appeared in these *Circulars.* (See No. 65, April, 1888; No. 69, February, 1889; No. 81, May, 1890; No. 89, June, 1891; No. 94, December, 1891; and No. 103, February, 1893).

Most of these expeditions have been into the Coastal Plain formations of the Chesapeake or of New Jersey or Virginia. In 1891, two longer trips were organized, one through the Chesapeake, and the other across the mountains as far as Frostburg. As this, however, proved to be rather too much for one spring, it was resolved in future to offer extended geological excursions to these two districts in alternate years. In pursuance with this plan the sixth annual expedition was arranged for in the mountains at the close of the last academic session. (See *University Circular*, Vol. XII, No. 103, p. 54, February, 1893.)

Owing to recent work upon the ancient volcanic rocks of South Mountain in Pennsylvania and Maryland it was deemed advisable to make this region the first objective point and to afterward examine the paleozoic formations of the Great Valley and of North Mountain.

The party of ten which left Baltimore for Blue Ridge Summit via the Western Maryland R. R. on Monday morning, May 29, consisted of Professor G. H. Williams, Miss Florence Bascom, Mr. U. S. Grant, Mr. E. B. Mathews, Mr. G. P. Grimsley, Mr. A. G. Leonard, Mr. A. C. Spencer, Mr. R. M. Bagg, Mr. S. L. Powell and Mr. H. W. Britcher. At Monterey, Pa. a stop was made for lunch at the Clermont, where the number was increased by the addition of Mr. Schantz of Gettysburg and by President Edgar of Wilson College, Chambersburg, with one of his teachers, Miss Bird, and several of his students. The remainder of the day was devoted to an examination of the railroad section between Monterey and the tunnel on Jacks mountain, where an admirable contact between the schistose greenstone and amygdaloid and the overlying Cambrian sandstone is exposed. At the east end of the tunnel the sandstone is much bent and folded; the contact is in the tunnel, about one third of the way from the east end; and in the cut at the west end particularly instructive exposures of the sheared greenstones are to be seen. On the return many fine specimens of the less altered basic volcanics were obtained; amygdaloidal basalt with vesicles elongated by flow, basaltic breccia and tuff beds, pumiceous ash beds, and greenstone slates produced by the shearing of amygdaloids. At the Gladhills road an excursion was made northward to the Bigham copper mine where the red and purple rhyolites with spherulitic, flow and amygdaloidal structures occur. The last locality visited on Monday was that at which the radiating masses of piedmontite occur on the west flank of Pine mountain.

On Tuesday an all day excursion was made to the remoter parts of the Monterey volcanic area. An early train was taken to Maria Furnace, whence the party walked up the valley of Tom's creek and back to Monterey by way of the Gum Spring road. The road lay almost entirely over the acid rhyolites, with beautiful flow- and spherulitic structures. Near the mouth of Copper run rocks composed almost entirely of spherulites as large as large peas were obtained. In the evening a train was taken from Monterey for Chambersburg, Pa., where the entire party was most hospitably entertained by President and Mrs. Edgar at Wilson College.

Early the next morning (Wednesday, May 31st) a train was taken for Graeffenburg, the terminus of a branch line at the site of Thaddeus Stevens' old iron furnace. This property is now owned and operated by the Caledonia Mining and Manufacturing Company and many kindnesses were shown the party by Mr. Ranney, their manager. Immediately upon the arrival of the train the party walked up the Buchannan valley, which runs northeast from Newman's corners on the Chambersburg turnpike. Here, at Geo. Cole's store, commences an area of coarse volcanic breccia occupying about two square miles. It is especially well exposed behind Musser's store where some of the large lava blocks were found to contain a very unusual association of piedmontite and scheelite (see *Am. Journal of Science*, (3) vol. 46, p. 50, July, 1893). A return was made to Graeffenburg and the night spent there.

The next morning (Thursday, June 1st) Raccoon creek, which flows northward along the east base of Rocky Ridge, a high mass of Cambrian sandstone bounding South Mountain on the west was visited. Previous examination had showed this locality to be richest of any in the mountain in those peculiar structures characteristic of glassy volcanic rocks. On this account it may be compared among the extensive fields of ancient rhyolite in South Mountain with the well-known Obsidian Cliff in the Yellowstone National Park. Its relationship to the more crystalline lavas surrounding it is much the same. Here many fine specimens of devitrified obsidian were collected. They exhibited in a very striking way all varieties of flow, lithophysal, perlitic and spherulitic structures, which had been preserved in all their delicate detail, in spite of their age. At night the party returned to Chambersburg, again to receive the hospitality of Wilson College.

On Friday, June 2d, President Edgar personally conducted an excursion to Harrisburg and thence northward along the Susquehanna river to examine the fine paleozoic section there exposed. The contact between the Trenton limestone and the Hudson River shales was seen at Harrisburg. A broad band of the latter rocks was then crossed by train and a walk along the railroad between Rockville and Dauphin displayed the sequence of Paleozoic strata up to the Mauch Chunk red shales in the Carboniferous. The ridge known as Blue Mountain is formed by the Medina sandstone; then follows a depression occupied by the shales and sandstones of the Clinton, Hamilton, Chemung, and Catskill groups, the Oriskany and Helderberg being at this point pinched out in the sharp fold. Finally Cove mountain succeeds the Catskill sandstone, formed by the harder beds of the Pocono, beyond which lies the village of Dauphin on the red shales. This section is described in volume D4 of the Second Geological Survey of Pennsylvania. On the return from this trip the party proceeded at once to Hagerstown, Md., where the night was spent.

On the following day (Saturday, June 3d) an excursion was made to the foot of North Mountain where it crosses the Potomac river. The train was left at McCoy's Station, on the Western Maryland railroad, at the western edge of the great valley. The Medina sandstone is here seen in contact with the Trenton limestone, a fault having concealed the Hudson river shales between. The sandstone is much crushed by friction. On the other side of this sandstone band a still greater fault brings the Hamilton shales of the Devonian into immediate contact with Lower Silurian (Medina) horizon. These Hamilton shales are at this point very fossiliferous, affording many specimens of trilobites, gasteropods, lamellibranchs, brachyopods, etc.[*] A short distance above the station high bluffs of the shales are exposed which exhibit on a large scale a perfect spheroidal parting—a phenomenon comparatively rare in rocks so finely schistose as these. From McCoy's the party walked northward over the Hamilton shales to Green Spring Furnace, and thence eastward over the shales and sandstone to the limestone of the valley at Clear Spring Station where an evening train was taken for Hagerstown. On this day's trip particular attentions were showed the party by Mr. Albert Small, of Hagerstown, who participated in the excursion, and by Mr. Bernhard Kinsell, of McCoy's, who has some knowledge of the local geology, and who kindly presented several specimens and Indian relics.

The University is under special obligation to Mr. Small for generously presenting to the geological collection a finely preserved mastodon tooth. This specimen belonged to the collection of his son, a young man of great promise, whose early death prevented the realization of many hopes. The facts relative to the discovery of this tooth are communicated by Mr. Small in the following words:

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[*] Fossils collected at this point by the party, as determined by Mr. G. P. Grimsley, are *Phacops rana; Pleurotomaria arata, Loxonema sp., Euomphalus sp.; Grammysia parallela Grammysia arcuata, Paracyclas lirata; Spirifera mucronata, Spirifera disjuncta, Strophodonta junia, Productella sp.*

"The Mastodon Tooth was contributed from the collection made in his short lifetime by Edgar A. Small, (son of Mr. and Mrs. Albert Small, of Hagerstown), who, although an invalid and unable to walk for eight years before his death, and dying just after passing his nineteenth year, had attained large scientific accomplishment in the study of Natural History, Geology and Ethnology.

"Learning of the existence of this specimen, and appreciating its scientific value, he procured it from Messrs. Haines & Whitson, Merchants, of Green Spring Furnace, its then owners. They had bought it a decade or more before from its discoverer. It remained in Edgar A. Small's collection from 1880 to the time of its presentation to the University.

"The tooth was found about 1863, by one Isaac Grove, who was then employed at the Green Spring Furnace, on the bank of Little Conococheague Creek, at the point at which the road from Clearspring to Lewis Charles's mill crosses. He says he found it just after a heavy storm, lying upon a pile of driftwood. This point is about 2½ miles south from Clearspring, and a mile north from Charles's mill, where the creek joins the Potomac. The creek rises about 7 miles north of Clearspring, in Blair's Valley. No other parts of the skeleton are known to have been found."

After a Sunday spent quietly in Hagerstown the last day of the trip, (Monday, June 5th) was devoted to examining the sections near Hancock and Harper's Ferry. An early train was taken for Cherry Run and thence to Hancock on the Baltimore and Ohio railroad. A walk was first taken as far up the river as the Round Top Cement works, in the course of which all the strata from the top of the Hamilton shales to the Niagara limestone were passed over in regular order. The especially fine folds in the red Salina sandstone at Round Top* were examined and a return made to Hancock by canal boat in time for lunch and the afternoon train for Harper's Ferry. During the remainder of the day attention was devoted to an examination of the interesting geology of this picturesque place. The Cambrian sandstone pushed over the younger shales on Maryland Heights, the gneiss-granite forming the axis of the mountain between Harper's Ferry and Weaverton, and the sandstones again appearing at the latter place were all seen and late in the evening those of the party who had not already left for other points returned to Baltimore.

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* A plate from a photograph of one of these folds is given opposite page 70 of the recently published World's Fair Book on Maryland, Baltimore 1893.

SCIENTIFIC NOTES.

The Saturnian Metre. By W. M. Lindsay, of Oxford (England).

[Abstract of a paper on the Saturnian Metre, published in the *American Journal of Philology*, Vol. XIV. Whole Nos. 54 and 55.]

[For a complete list of the extant Saturnians and a discussion of the types under which they fall see No. 55, pp. 310–324. Reprints of the entire paper may be obtained by application to the Johns Hopkins Press. Price, 30 cents.]

The Roman Metricians of the Empire declared the Saturnian verse to be a compound of an Iambic Dimeter Catalectic with a Trochaic Tripody:

dăbū́nt | mălū́m | Mĕtḗl|lĭ ‖ Naḗvĭ|ṓ pŏ|étaĕ,

though they acknowledged their inability to suit any but a few lines to this Procrustean scheme (nostri autem antiqui, ut vere dicam quod apparet, usi sunt eo, non observata lege; nec uno genere custodito inter se consonant versus; sed praeterquam quod durissimos fecerunt, etiam alios breviores, alios longiores inseruerunt, ut vix invenerim apud Naevium quos pro exemplo ponerem, *Gramm. Lat.* VI, p. 265 K). That they should have taken for granted that the metre was quantitative, and not accentual, was only to be expected, seeing that all their statements about metre are borrowed from Greek sources. But the quantitative theory of Saturnians needs no other refutation than the attempts made by its adherents to scan quantitatively the extant Saturnian lines. It suits admirably a few lines, like the epigram of the Metelli on Naevius, just quoted; but it will never do for lines like

Runcŭs | atquĕ | Purpureus, filii Terras.
isquĕ | susŭm | ad caelum sustulit suas res.

The earlier adherents to the theory in modern times went boldly on the assumption that, since Saturnian Metre was a metre of the Early Latin Period, no irregularity of quantity in a word need excite surprise. The final vowel of *-que* (*atque, isque*) was, they alleged, 'in all probability originally long.' But unfortunately for their easy-going method, the science of Comparative Philology has come into existence since their time, and has proved beyond the possibility of doubt that the enclitic *-que* was at all periods of Latin a short syllable, so short indeed that in ordinary rapid utterance the vowel was lost altogether, even before a word beginning with a consonant, *neque* thus becoming *nec*, *atque ac* (for **atc*). Even in cases where a vowel can be made out to have been originally long, as the final *-a* of *vita*, etc., if it can be shown, as this *-a* can be shown, to be invariably short in contemporary poetry, it is very questionable whether a traditional prosody can be allowed to it in a Saturnian line, *e. g.*

quoiei vita defecit, non honos, honore,

in the latest Saturnian epitaph of a Scipio, c. 130 B. C. Another rock on which the older form of the quantitative theory is shattered, is the treatment of a word like *facile* in

facile facteis superases gloriam maiorum,

like *subigit* in

subigit omne Loucanam opsidesque abdoucsit.

For the scansion of the tribrachs *făcĭlĕ, sŭbĭgĭt* as iambi, *i. e.* with the metrical ictus on the second syllable, violates one of the elementary laws of Early Latin Metre. Neither Plautus, nor Terence, nor any of the early poets allow so violent a conflict of verse-ictus with the natural accent of the word as *facíle, subígit.* The most recent supporters of the quantitative theory adopt one or other of the two possible methods of avoiding these difficulties. Some stipulate that in Saturnian Metre every final syllable might be treated as an arsis, and scan *facilḗ, subigī́t, isqué, atqué*, the final syllables of these words being lengthened *in arsi*, like the final syllable of *populus* in a hexameter of Ennius (*Ann.* 85 M.) in the hephthemimeral caesura,

sic exspectabat popul*us* atque ora tenebat,

or the final syllable of *aquila* in the penthemimeral (*Ann.* 149 M);

et densis aquil*a* pinnis obnixa volabat.

But while Ennius avails himself of this licence very seldom, it would by the admission of the latest champion of this theory occur no less than 63 times in 127 Saturnian lines (Reichardt, *Fleck. Jahrb. Suppl.* 19, 234); and while Ennius is probably imitating the Greek epic usage, such imitation cannot be supposed possible for the original framers of Saturnian verse. Besides, even if we allow this extraordinary licence to Saturnian Metre, these scansions, not merely *isqué, atqué*, etc., but *partím erránt, éorúm sectám, sanctús Delphís*, etc., etc., are quite inconsistent with a usage of early iambic poetry, which we know to have been a native Latin usage, and not derived from the Greek. Plautus, and the other dramatists, show a marked repugnance to the incidence of the metrical ictus on the final syllable of spondaic words and endings, whereas this form of the quantitative theory requires this discordant clash of ictus and accent in an overwhelming majority of Saturnian lines. The other form of the theory escapes these difficulties by allowing a substitution at will of trochaic for iambic metre, and *vice versa*, scanning *ísque súsum, deínde póllens, sánctus Délphis*, etc., as trochees and iambi. But it too will be found to break down in the second half of lines like vv.

deinde pollens sagittis inclutus Arquitenens
sanctus Delphis prognatus Pythius Apollo.

For if, to avoid the scansion *ínclu|tū́s Ar|quitenens*, we substitute iambic for trochaic rhythm, this will involve the metrical accentuation *inclútus Pythíus*, an incidence of ictus which, is never allowed by Terence, and very rarely by Plautus, in their iambic lines. And further, we have a syllable too few: *īnclū́tŭs | Arquī́tĕ|nens, Pȳthī́ŭs | Ăpṓl|lo.* The quantitative school generally get over a difficulty of this sort by their theory of occasional 'suppression of a thesis;' but it is hard to see how this could, with any likelihood, be posited for a word like *Apollo.*

We have thus seen that it has been found impossible to scan Saturnian lines in the same manner as the quantitative trochaic and iambic lines, which the Romans borrowed from Greek literature. The two recent attempts to save the quantitative theory have been in the direction of ignoring the quantitative nature of Saturnian verse; one, by allowing every final syllable to have the arsis, ignoring the distinction between long and short final syllables, the other, by allowing trochaic to be substituted at pleasure for iambic rhythm, almost emancipating the lines from the bonds of quantity or anything else. The *a priori* considerations too are all against the quantitative nature of the native Italian poetry. Greece stands alone among the nations of antiquity in possessing an entirely quantitative metre. The older Latin quantitative poetry, a poetry borrowed from Greece, pays great regard to the natural accent of the words. Plautus and Terence avoid, as far as they can, the clashing of accent and ictus, as Ritschl laid down in his famous thesis; cum quantitatis severitate summa accentus observationem, quoad eius fieri posset, conciliatam esse. In fact, if we examine the poetry of the earliest Latin imitators of Greek metres, for traces of the native poetry, (and this surely is the right way to set about the enquiry), we find regard for the accent of the words, and fondness for alliteration, to be the two leading characteristics, which are gradually effaced under Greek influence; to which we may add that prosodical hiatus (*i. e.* shortening without elision) of a long final vowel, or a final *m*, is more affected in the earlier poetry while complete elision is the rule in the classical period. The conviction has thus gradually forced itself on students of Early Latin that the Saturnian metre must have been accentual, and not quantitative. Accentual poetry we know to have been in existence in the Republican and early Imperial periods among the poorer classes at Rome, as, for example, the Fescennine doggerel of soldiers at their general's triumph, such as the lampoon on the florid face of Pompey:

> quém non púdet ét rúbet nón est hómo sed rópio (Sacerd. p. 462 K.),

which is an accentual trochaic septenarius. The advent of Christianity made the accentual metre of the poor man the metre of the Church and the nation. What then could be more natural than that the earliest indigenous poetry should have been accentual too? The laws of accentuation of the period of the Saturnian poetry can be shown from various indications to have been similar in all important respects to those of the Imperial period, for which we have the testimony of the writers on accent to guide us. The accent fell on the penultima, if it was long; if it was short, on the antepenultima, e. g. *decōrem, décŏrem.* Subordinate or enclitic words, like prepositions, the substantive verb, &c., were fused with the word to which they are attached into a word-group, which took the ordinary accent of a single word, e. g. *in-témplo, víctus-est* or *victust.* Similar word-groups are indicated by Plautine versification for (1) preposition with monosyllabic (unemphatic) pronoun, e. g. *apúd-vos, ín-me,* like Gk. *πρός με*, Engl. 'fór him,'' Irish for-m, 'ón me' (2) demonstrative or possessive (unemphatic) pronoun with noun, e. g. *voluptás-mea, hoc-sáxum* (3) auxiliary verb with main verb, e. g. *volo-scíre* (4) nouns of subordinate meaning, like *res*, with an adjective, &c., e. g. *quá-re, suás-res,* like Engl. 'nó-thing,' 'sóme-thing,' and so on. When an appended *-que, -ne,* was elided, the accent seems in the time of Plautus to have been allowed to rest on the same syllable as in the simple word. But in other cases elision did not cause retraction of accents; though the word-group *pleriqu(e) omnes* has in Plautus and Terence the metrical ictus invariably on the first syllable of each word. At some early time, before the earliest literary period, a different Accent Law had prevailed by which every Latin word was accented on the first syllable, e. g. *óccīdo, ínquīro;* and in the time of Plautus and Terence a trace of this still remained in the accentuation of the first syllable of four syllabled words whose first three syllables were short, e. g. *fácilius, cápitibus, ópiparum.* But in the case of other words the accent had before this time shifted from the first syllable to the penultimate or antepenultimate. No doubt long words, like *tempestatibus, onerariae,* would have at all periods of the language two accents, a main and a secondary (perhaps the 'media prosodia' of Varro). In the period of the older accentuation the main accent would fall on their first, the secondary accent on their antepenultimate syllable; so that the change from the old accentuation to the new would be in reality nothing but a usurpation, by the secondary accent, of the prominence of the main accent, *témpestàtibus* becoming *tèmpestátibus, óneràriae* becoming *ònerárìae.* Traces of this secondary accent remain in Italian, e. g. in the double consonant of pellegrino from Lat. *pèregrínus,* seppelire from Lat. *sèpelíre;* while the vowel of Fiorentino, Lat. *Flòrentínus,* contrasted with Firenze, Lat. *Florĕntia,* shows us that it asserted itself more strongly in quadrisyllables of one form than of another. In the Saturnian Poetry this secondary accent was always taken into account where it asserted itself strongly enough, viz. in five syllabled and longer words everywhere, in four syllabled words (except those of the form ⏑ ⏑ ⏑ ⏓ e. g. *câpitibus, ópiparum*), at the beginning of the line always, and perhaps occasionally under special circumstances elsewhere. The first halfline of the Saturnian Poetry has always three accents (including secondary as well as main accents), the second always two; the first syllable of the line is invariably accented. Thus we scan the verse first quoted in this way:

> dábunt málum Metélli || Naévio poétae.

This incidence of the accent on the first syllable of each line is a strong proof of the accentual nature of the Saturnian Metre; for if the first hemistichs were quantitative iambics, how could we explain the fact that no line begins with a word accented on the second syllable, e. g. *subégit aedílis.* (*aetate* in

> aètáte quom-párva | pósidet hoc-saxsum,

is written *aetate* but pronounced *aèvitáte,* as *aeterni* in another metrical (iambic) inscription (Orell. 6017) has to be scanned *āĕvĭtĕrnī*). It appears to have been this requirement that changed the natural order of 'aedile consul censor' in the familiar lines to *consol censor aidilis,* and that led to the awkward substitution of the present for the perfect tense in *subigit omne Loucanam.* But the metre, the poetical element of the Saturnian line, must have depended on something more than the mere fact of there being three incidences of stress in one halfline, and two in the other. If that were all, what would prevent almost any sentence of Cicero's speeches from possessing Saturnian metre, *e. g.* Phil. I, init:

> ántequam dè-república, || pátres conscrípti,
> díc(am)-ea quaè-dicénda || hoc-témpore árbitror.

Syllable-counting is the main element in Aryan metre; it is one of the principal elements in modern Italian and Romance metres generally. It is only natural that it should have played a considerable part in the native metre of the Latins. To the two rules mentioned above: (1) *that the accent falls on the first syllable of every line;* (2) *that there are three accents in the first hemistich, two accents in the second,* we must add a third rule; (3) *the normal number of syllables is* 7 *in the first hemistich,* 6 *in the second.* This rule we must qualify by the addition that a certain type of line shows a five-syllabled second hemistich, *e. g., fuisse virum* (see below), and that two short syllables, comprised in the same word are occasionally allowed to stand for one syllable, *e. g., căpĭtibus opertis.* This latter departure from the rule cannot have been much of a departure in reality; for *căpĭtibus* would not sound very differently from **cáptibus* (cf. *óptuma* for *ŏpĭtuma; òfficína* for *òpĭficína*). On a hexameter inscription of Mummius of 146 B. C. *făcĭlia* is treated as a dactyl. It was evidently regarded as a licence, to be kept within bounds; for this resolution of a syllable is not allowed twice in the same hemistich; probably not even in the same line.

The number of syllables in the lines depended of course on the laws of elision. These seem to have been very simple. All final short vowels were elided before an initial vowel, while final long vowels, and final syllables ending in *m,* were not elided but shortened, except in a few cases of subordinate words closely joined to a following word, *e. g. t(e)-órant.*

Another factor to which we must give equal prominence with the number of syllables is the alternation of the accentual rhythm. Using the German terms, 'falling' accentuation to describe the pronunciation of words like *dábunt, málum, Naévio,* 'rising' accentuation to describe that of *Metélli, poétae,* we may state our rule thus:

(4) *after the first two feet there is a regular alternation of accentual rhythm, a 'rising' rhythm being followed by a 'falling,' and vice versa.* The commonest type of first hemistich is that of *dábunt málum Metélli,* with 'rising' accentual rhythm, *Metélli,* following on the 'falling' rhythm of the first two feet, *dábunt málum.* To a first hemistich of this type (the A-type, we may call it), is almost always joined a second hemistich of this form: *Naévio poétae,* with 'falling' rhythm, *Naévio,* followed by 'rising' rhythm, *poétae* (the common or A-type of the second hemistich). There is a less common form of the first hemistich (the B-type, we may call it), where the third 'foot' exhibits, not 'rising' but 'falling' accentual rhythm, as *e. g.* prím (a) incédit Céreris; to this is regularly joined a corresponding by-form

(B-type) of second hemistich, as: *Prosérpina púer*, with 'rising' followed by 'falling' rhythm, the aim of this combination apparently being to secure a regular alternation of 'falling' and 'rising' rhythm throughout the line. The 5-syllabled form of second hemistich, *e. g. fuisse virum*, satisfies perfectly the rule of alternation of accentual rhythm, though it breaks the rule regarding the number of syllables. And in general we find the two last rules departed from only for the sake of securing some other effect, such as alliteration or rhyme.

Alliteration does not play in Saturnians the part that it does in Teutonic verse, where it constitutes the chief element of the rhythm, the emphatic word of the first half-line alliterating in its first (*i. e.* its accented) syllable, with the emphatic word of the second half-line. In the Latin Saturnian, alliteration is nothing but an ornament, used or not as the caprice of the poet directs, but an ornament so frequently used as to suggest that at an earlier stage of the metre it must have been almost as essential to the rhythm as in Teutonic poetry. The practice of alliteration is closely connected with the accentuation of the first syllable, so that it is probable that the period of the early Accent Law, was the period of its fullest activity. In the scanty fragments of Saturnians in other languages of Italy than Latin (two short Pelignian inscriptions are all that have been preserved to us), Alliteration plays even a greater part than in Latin Saturnians. Livius, Naevius, and the other Saturnian writers, seem to require that, if two words alliterate, they must be neighboring words, so that *dabunt malum Metelli*, not *malum dabunt Metelli*, is probably the true arrangement. In Plautus the second element in a verb compound may alliterate when it is accented; and this may have been allowed in Saturnian poetry too, *e. g. prim(a) incedit Cereris.*

Rhyme is another ornament much sought after in the final syllable of each hemistich, though it never rose to such importance in the Latin Saturnian as in the poetry of the later Empire and the Middle Ages, nor yet as it appears to have done in Celtic poetry. For the sake of securing rhyme or assonance, the regular structure of the line seems occasionally to be sacrificed, *e. g.*

úrit, pŏpŭlátur, vást*at*, || rem-hóstium concínn*at*,

where *urit, vastat, populatur* would be the regular Saturnian order. Rhyme, like alliteration, shows itself not infrequently in the earlier Latin quantitative poetry, in Plautus, Ennius, the older Tragedians, etc.

The scantiness of our material does not allow us to determine with certainty whether the arrangement of lines in distichs was a practice, usual or occasional of Livius and Naevius. But it is undoubtedly the case that when, as rarely happens, two neighboring lines from the 'Odyssea' or the 'Bellum Poenicum' have been preserved to us, a correspondence of structure between the two is perceptible, any irregularity in the rhythm of the first line being echoed in the second line of the distich, as in the first hemistichs of vv., with six, instead of seven, syllables:

námque núllum péius || mácerat humánum
quámde máre saévum, || vís-et-cui sunt-mágnae,

or the second hemistichs of the following verses, which show an occasional variety of the A-type:—

sénex, frétus pietáti, || adlocútus súmmi
régis frátrem Neptúnum, || regnatórem márum,

As to Caesura, the rules which can be drawn up for Saturnian verse are dependent on the four (or rather three) main rules, of Accentuation, Number of Syllables, and Alternation of Accentual Rhythm, and are implied by them. The only Caesura that really formed of itself an element of Saturnian Metre was the break between the two hemistichs, where a short vowel is not elided, *e. g.* the following verses:

Quàm cum-stúpro redíre || ád-suos pŏpŭláris,

the others, viz. the occasional break between the first and second 'feet' of the first hemistich, and the usual break between the first and second 'feet' of the second hemistich, are merely the conditions under which a certain number and arrangement of accents, combined with a certain number of syllables, can be secured.

On the Spurious Character of Dem. XXXIV. By Wm. Hamilton Kirk.

(Abstract of a paper read before the University Philological Association, October 20, 1893.)

In considering whether this and other forensic speeches in the Demosthenean corpus are to be regarded as genuine, we can take as a criterion neither the vocabulary nor the syntax; for both are classical in the orations whose style most obviously exposes them to suspicion. Tests are to be found rather in the employment of the vocabulary, in the use or neglect of rhetorical figures, and in the method of construction. The following application of these tests to Or. XXXIV is based on a comparison of that speech with the fourteen private orations which Blass accepts as genuine.

As to vocabulary, it is to be noticed that Demosthenes employs denunciatory epithets, where expedient, with much vigor and boldness, and that the use of such words in Or. XXXIV is markedly timid and hesitating; also, that the insertion of *θηρίων* at the end of the epilogue is contrary to the habit of Demosthenes, whose conclusions are always dignified and comparatively calm.

Of the figures of speech, two are very noticeable in Demosthenes: repetition, which occurs rarely in the form of epanadiplosis, frequently in that of anaphora; and asyndeton, which has also two forms. The simple asyndeton may be used to begin a narrative, to add an explanation, to resume the speech after the introduction of testimony, to call upon the clerk for documents. The asyndetic sequence of words or clauses may give an effect of rapidity, of serious emphasis, of warmth and vehemence; it is often associated with the expression of strong feeling. In Or. XXXIV repetition and asyndetic sequence are wholly wanting, while simple asyndeton appears only in its weakest forms, twice after the introduction of testimony, once to embody a pathetic appeal, the least energetic of the feelings with which this figure is associated.

Of the figures of thought, three stand out prominently in the style of Demosthenes: irony, apostrophe and interrogation. The first, which is properly rather a *ἕξις* than a *σχῆμα*, is a marked trait in the character of Demosthenes and therefore in his style, where it exhibits itself either in very brief utterances or throughout long passages and whole speeches. In Or. XXXIV not a single instance of ironical expression is to be found, although the circumstances of the case offer much occasion for sarcastic comment, and although the writer makes no inconsiderable use of a figure to which Demosthenes often gives an ironical tone, apostrophe. This too appears, in the genuine speeches, often in short phrases, while often it occupies long passages; essentially passionate in tone, it is rarely used by Demosthenes as a vehicle of argument, the exceptions to this being easily explained. But in Or. XXXIV we find the chief part of the argumentation put in apostrophic form, and on the other hand no instance of the brief, sharp apostrophic utterances in which Demosthenes delights.

The question is best understood if classified by its content; the questions in the genuine private speeches can be arranged, for the most part, under five heads: (1) argument; (2) appeal; (3) assertion; (4) challenge; (5) suggestion. The bold challenge and the lively suggestion are wanting in Or. XXXIV; and whereas the argumentative question is rarest, and indeed not easy to establish, in Demosthenes, the author of Or. XXXIV uses interrogation, like apostrophe, in connection with the argumentative parts of his speech.

To the rhetorical question Demosthenes often gives a rhetorical answer, *οἶμαι, οὐκ ἔστι ταῦτα*, and the like; similarly, he introduces sharp contradictions after a supposition, or brief, emphatic parentheses; finally, after a question, a short negative appeal, *μηδαμῶς*. This, the least emphatic of such phrases, is the only one found in Or. XXXIV.

Important constructive elements in Demosthenes are *τοίνυν, μὲν οὖν* and a great variety of deictic words, such as demonstrative pronouns in emphatic positions, and verbs or verbal phrases denoting perception or assertion; these are used not only singly, but in complexes, often with a brief summary of facts; cf. XXXVIII 19, LIV 13. These particles, words and phrases belong to the sphere of argument, and are expelled by the intrusion of passion; if their regular recurrence in the argumentation is disturbed by the generally passionate tone of a particular speech—as in Orr. XXXIX, XLV—Demosthenes makes up for this by variety of expression, and especially by employing many short clauses and questions; but he never allows the reasoning to be obscured by too free and massive a use of forms suited to the expression of feeling. Now in Or. XXXIV, we find on the one hand that *τοίνυν* and *μὲν οὖν* are used in a proportion unusual with Demosthenes, and that there are but eight examples of deictic words, employed meagrely and not with the fullness and complexity which he affects; on the other hand that these words, which Demosthenes employs only as elements of argumentation, and never fails to employ to some extent in that connection, are wholly absent from those passages of Or. XXXIV in which the writer develops his chief arguments.

In passing from one topic to another, Demosthenes always marks his transitions with much distinctness, while at the same time making close and visible connections between the different portions of his speech. In both respects the author of Or. XXXIV fails; his transitions are hasty and indistinct, while in 46 there is a want of continuity.

The *ἠθοποιία* of the speech is decidedly defective; the tendency to argue and expostulate with the adversary betrays a naiveté, which the example of Or. LV does not excuse, and which, as a comparison with Or. XLI shows, is not to be defended by the plea of inexperience in legal proceedings. In situation and circumstances Or. XXXIV most nearly resembles Or. XXXVII; but no two speeches could be more dissimilar in style and tone. In short, all tests of comparison seem to confirm the opinion enunciated, without discussion, by A. Schäfer and by Blass, that this speech has not Demosthenic character.

John Lyly and Euphuism. By Clarence Griffin Child.

(Abstract of a paper read before the University Philological Association, November 17, 1893.)

Lyly's work remains the basis of any study of Euphuism, as being at once its most significant and characteristic product. The native and original element added by Lyly in his subject matter, his perfect accord and sympathy with his age, gave him success where Petty, almost his equal in point of style, had failed. This style, in its inspiration and general method, is ultimately referable, as shown by Landmann, to the beginnings of the century and the influence of Guevara. Previous analysis of it has erred in paying exclusive attention to certain marked features. The use of allusions to "unnatural history" is not exclusively Euphuistic. Antithesis occurs apart from parison, and this and parallelism are consistently applied in every structural relation. Alliteration is used for euphony, as well as to superinduce emphasis, and not in one set form, the transverse, only, but a number; use and method both were borrowed from verse, as shown by examples. Lyly's rhythm is not "poetic," as Goodlet called it, but rather declamatory—no accidental feature of the balanced style as Schwan maintained, but one recognised by Lyly, for he maintains it apart from his balanced structures, and one prose passage (Midas) is printed as verse. Lyly's plays afford statistical evidence that he was surrendering his formal Euphuism, and approaching a style like that of Sidney. The Euphuist, though primitive and limited in his range of technical knowledge, possessed a complete system; his artificiality is due to his extravagant use of the few principles he understood; his aim was to attain clearness and vigor by use of antithesis and parallelism in conjunction with various mechanical devices to enforce emphasis. The literature he produced is not, as Morley would lead us to believe, the mere froth of a fermenting age; it helped England to appreciate the value in prose-form of clearness, precision, rhythm, formal unity. It taught her once for all certain methods for their attainment.

As regards the "high style," it is noteworthy that Lorenz (1279) in the character of his allusions, and the method of their use, in his frequent employment of "parisonic" * antithesis, anticipates the masters of the 15th and 16th centuries. Dan Michel (1340) in literally translating him, is moved to do occasionally what Lyly two hundred years later was to do extravagantly—employ alliteration to enforce parison. Guevara and his congeners are not wholly, as generally supposed, the creatures of the Renaissance. Just as we trace back the drama of to-day through the interlude to the miracle-play, so to explain the modern essay we must go back through the Norths and Guevaras to the theological homilists like Lorenz and Maurice de Sully.

On the Assimilation of Free Nitrogen by Plants. A Preliminary Communication. By John P. Lotsy.

The question whether higher plants are able to assimilate the free atmospheric nitrogen, has, on account of its great scientific and economic importance, been often treated. The question has been, since Boussingault, answered by most botanists in the negative, only Frank c. s. having answered in the affirmative. The experiments made are as yet, however, far from conclusive, and this fact led me to undertake the present work.

In a general way, there are among those who have approached the question of the assimilation of free nitrogen two different schools, which, though not absolutely opposed, yet differ so fundamentally in their way of experimenting, that the results which they get do not answer the same question even if they seem to do so.

When Hellriegel's school approaches the question of the assimilation of free nitrogen, they begin by keeping away from the plant all sources of fixed nitrogen. Therefore, the seed is sprouted in distilled water, subsequently planted in sand washed with acids and heated to redness, and carefully prepared nutritive solutions free of nitrogen are used for watering it. If the plant grows now and shows upon chemical analysis more nitrogen in its substance than was stored away in its seed, one concludes that the plant is able to assimilate free nitrogen.

When Frank c. s., on the other hand, are attacking the same question, they do so in a fundamentally different way. The beginning is the same, but the seed is not planted in a soil free of nitrogen, but in one which contains a certain known amount of fixed nitrogen. If it is thus known for example that the soil contained 3 gr. of fixed nitrogen, and that subsequently a seed was planted in it containing 0.5 gr. of fixed nitrogen, then the young plant starts life with a capital of $3+0.5=3.5$ gr. fixed nitrogen. If now later on the analysis of the soil gives 1 gram and that of the plant 2 gr., we find $2+1=3$ gr. fixed nitrogen, or less than the starting stock, consequently there was no need for the plant to assimilate free nitrogen; whether it did so or not remains to be seen. If on the other hand we find at the end of the experiment 3 gr. in the soil and 2.5 gr. in the crop, we get $3+2.5=5.5$ gr. or 2 gr. more than the starting stock. The only source whence this surplus can be conclusively derived is the atmosphere.

After the third method, which is followed by Schloesing c. s., the plant is cultivated in a limited space and a gas analysis made of the air contained in it at the beginning and at the end of the experiment; a decrease in the free nitrogen of the air indicating a fixing of nitrogen on the part of the plant.

Now let us see the several questions that are really answered.

Method one, strictly taken, does not answer the question whether the plant is able to assimilate free nitrogen, but whether the plant is able to live entirely without fixed nitrogen. Method two answers the question whether the plant is able to assimilate free nitrogen, but not whether the plant is able to live entirely without fixed nitrogen. Method three may answer both questions depending on the fact whether there was fixed nitrogen in the soil at the beginning of the experiment. This method answers it also directly and would certainly be preferable if there were not such great technical difficulties accompanying it.

At present, I take it, the only way to reach a well-founded conclusion is to apply all three methods to the same plant. It might be possible that a plant was able to assimilate free nitrogen and yet perished under a treatment after the first method, while it needed during some part of its life or other more or less fixed nitrogen. Now let us take for granted that we have applied all three methods to the same plant, and have reached the result that the plants assimilated free nitrogen after all three methods; are we then absolutely sure that this is so? No, even then we are not; we yet have the chance that microorganisms, present in the culture media, assimilated the free nitrogen and that the plants used this nitrogen fixed by the lower organisms.

It is, therefore, necessary not only to treat a plant after all three methods, but also to have two parallel rows of experiments within *every* method, one row being sterilised, the other not. It was planned to treat in this way the white and black mustards, which were selected for various reasons.

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* 'Parisonic' which, it seems, has here become a technical word, is not only a monstrous formation, but suggests a wrong meaning, *pari-sonic* as if from *par(i)-* and *sonus*. *Parisic* is not good, but might pass. A legitimate formation would be *parisotic*.—B. L. G.

The experiments after the first method have been finished and are now in press; they will be published as Bulletin No. 18, by the U. S. Department of Agriculture.

The following diagram shows clearly the arrangement of the cultures.

- Not Sterilised
  - Sand Cultures
    - Nitrates
      - WM
      - BM
    - No Nitrates
      - WM
      - BM
  - Water Cultures
    - Nitrates
      - WM
      - BM
    - No Nitrates
      - WM
      - BM

- Sterilised
  - Sand Cultures
    - Nitrates
      - WM
      - BM
    - No Nitrates
      - WM
      - BM
  - Water Cultures
    - Nitrates
      - WM
      - BM
    - No Nitrates
      - WM
      - BM

In this WM means a row of white mustard, BM a row of black mustard, so that, in all, 16 rows of experiments were made.

The methods are described in detail in the full report, which is also provided with illustrations after the photographed plants. The results are that neither white nor black mustard is able to live without free nitrogen, notwithstanding the behavior of the black mustard in the unsterilised sand cultures might easily lead one to believe that it could.

UNIVERSITY SCHOLARSHIPS, 1893-94.

The Board of University Studies, at a meeting held January 10, awarded University Scholarships to the gentlemen named below:

C. G. Child (A. B., Trinity College, Conn). *English.*
F. H. Clutz (A. B., Midland College). *Astronomy.*
R. N. Hartman (A. B., Pennsylvania College). *Chemistry.*
G. H. Hill (A. B., Williamsport Dickinson Seminary). *Electricity.*
T. F. Kane (A. B., De Pauw University). *Latin.*
H. McE. Knower (A. B., Johns Hopkins University). *Biology.*
C. C. Marden (A. B., Johns Hopkins University). *Romance Languages.*
H. L. Moore (A. B., Randolph Macon College). *Economics.*
T. F. Moran (A. B., University of Michigan). *History.*
L. T. More (Ph. B., Washington University). *Physics.*
C. W. Peppler (A. B., Johns Hopkins University). *Greek.*
L. M. Prindle (A. B., Williams College). *Geology.*
H. A. Sayre (B. E., University of Alabama). *Mathematics.*
W. S. Symington, Jr. (A. B., Johns Hopkins University). *Romance Lang.*
J. H. Tudor (M. S., Lafayette College). *Mathematics.*
H. L. Wilson (A. M., Queen's University, Canada). *Latin.*
C. F. Woods, Jr. (A. B., Johns Hopkins University). *German.*

C. J. West (A. B., Johns Hopkins University). *English.* (In case of a vacancy.)

HOPKINS SCHOLARSHIPS, 1893-94.

Graduates from Virginia and North Carolina.

Honorary Scholars:

J. C. Ballagh (University of Virginia), of Virginia.
T. L. Blalock (S. B., Wake Forest College), of North Carolina.
C. R. Duvall (S. B., West Virginia University), of Virginia.
J. H. Gorrell (A. B., Washington and Lee University), of Virginia.
S. R. Hendren (A. B., Washington and Lee University), of Virginia.
J. R. Hunter (A. M., Wake Forest College), of North Carolina.
Alexander McIver (A. B., University of North Carolina), of North Carolina.
S. R. McKee (A. B., Davidson College), of North Carolina.
J. H. Pridgen (A. M., Wake Forest College), of North Carolina.
R. S. Radford (Ph. D., University of Virginia), of Virginia.
B. L. Reid (A. B., Erskine College), of Virginia.
George Shipley (A. B., Randolph Macon College), of Virginia.

Scholars:

E. C. Armstrong (A. B., Randolph Macon College), of Virginia.
B. W. Arnold, Jr. (A. B., Randolph Macon College), of Virginia.
M. H. Arnold (A. B., Washington and Lee University), of Virginia.
J. A. C. Chandler (A. B., William and Mary College), of Virginia.
W. B. Daniel (A. M., Wake Forest College), of North Carolina.
J. V. Lewis (S. B., Harvard University), of North Carolina.
C. N. McBryde (S. B., University of South Carolina), of Virginia.
J. M. McBryde, Jr. (A. B., University of South Carolina) of Virginia.
A. M. Randolph, Jr. (A. B., Johns Hopkins University), of Virginia.
B. F. Sharpe (A. B., Wesleyan University), of Virginia.
T. H. Taliaferro (C. E., Virginia Military Institute), of Virginia.
L. N. Whealton (A. B., Western Maryland College), of Virginia.

Undergraduates from Maryland.

Honorary Scholars:

Eli Frank.
Stuart S. Janney.
Marcus Kaufman.
Edward S. Oliver.
Frank R. Rutter.
Simon H. Stein.

Scholars:

Ernest J. Becker.
Gilbert A. Coblens.
Walter Cox.
Robert Lacy.
Henry Lanahan.
St. George L. Sioussat.
John W. R. Sumwalt.
Campbell E. Waters.
John M. West.
Horace S. Uhler.

ADDITIONS TO CHECK LIST OF STUDENTS.

(See *University Circulars*, No. 108.)

Graduate Students.

Chambers, Henry E.* New Orleans, La. Tulane Univ. *History and Politics.* 925 McCulloh.

Freeman, Charles C.* Meadville, Pa. A. M., Allegheny. *Chemistry.* 314 W. Hoffman.

Laing, Gordon J.* Toronto, Ont. A. B., Toronto. *Greek and Latin.* 1213 Bolton.

Magruder, William H.* Baton Rouge, La. A. B., Univ. of Mississippi. *Latin and English.* 1108 N. Eutaw.

Wilson, Robert L.* Shelbyville, Ill. S. B., Rose Polytechnic. *Electricity.* 1313 Linden av.

Physicians Attending Special Courses.

Brown, Francis E.* Baltimore. M. D., Univ. of Maryland. *Bacteriology.* 750 W. Lexington.

Chase, Herbert E.* Auburn, Me. M. D., Dartmouth. *All Courses.* 432 N. Broadway.

Davis, Bessie D.* Falmouth, Mass. M. D., Coll. of Phys. and Surg. (Boston.) *All Courses.* 907 McCulloh.

Friedenwald, Julius.* Baltimore. M. D., Coll. of Phys. and Surg. (Balt.) *Special Research.* 310 N. Eutaw.

Humphrey, Orman B.* Bangor, Me. M. D., Dartmouth. *All Courses.* 432 N. Broadway.

Scane, John W.* Chatham, Ont. M. D. C. M., McGill Univ. *Pathology and Surgery.* 615 St. Paul.

Smith, Irving W.* Charles City, Iowa. M. D., Jefferson Med. Coll. *Bacteriology and Pathology.* 1910 Mt. Royal Terr.

Wethered, John L.* Chestertown. M. D., Univ. of Pennsylvania. *General Medicine.* 1640 E. Fayette.

Special (Undergraduate) Student.

Frost, Francis L., Jr.* Charleston, S. C. University of the South. *Renouf. Chemistry and Romance Languages.* 1113 Bolton.

*Students not connected with the University in the last academic year.

The number of students enrolled in the University during the academic year (to January, 1894), is 515 (336 graduates and 179 undergraduates.)

Ten lectures on the Philosophy of History by Dr. William T. Harris, United States Commissioner of Education, were given on Saturday mornings at 9 o'clock, in the Physical Laboratory, concluding January 20.

The special topics were: 1. Asiatic Peoples and the Lessons their Civilizations teach us; 2. Contrast between Asia and Europe in respect to fundamental Ideas of Civilization; 3. Greece; 4. Greek Art; 5. Relation of Greek Art to Greek Science; 6. Rome; 7. The Arrival of Christianity; 8. Mahommedanism and its Significance in the History of Europe; 9. The Era of Revolutions against Authority in Philosophy, Theology, and Civil Government; 10. The Historical Tendency of the Present Age.

PROCEEDINGS OF SOCIETIES.

Scientific Association.

October 25, 1893.—Business meeting. The following officers were elected:
President: E. RENOUF; *Vice-President:* E. A. ANDREWS; *Secretary:* C. L. POOR.

November 15.—One hundred and eleventh meeting. Professor Renouf in the chair.
Specialties in Science, by SIMON NEWCOMB.
Assimilation of Nitrogen by Plants, by J. P. LOTSY. (See p. 30.)

December 20.—One hundred and twelfth meeting. Professor Renouf in the chair.
Stereo-chemistry, by IRA REMSEN.
The Satellites of Jupiter, by C. L. POOR.

Philological Association.

October 20, 1893.—One hundred and twenty-eighth regular meeting. Professor Gildersleeve in the chair. Forty members present.

On the Spurious Character of Demosthenes XXXIV, by W. H. KIRK. (See p. 29.)
The Story of Mudgala and Mudgalānī, by M. BLOOMFIELD.

November 17.—One hundred and twenty-ninth regular meeting. Professor Gildersleeve in the chair. Fifty-one members present.

John Lyly and Euphuism, by C. G. CHILD. (See p. 30.)
The Suffix Pronoun of the Second Person Feminine Plural in Assyrian, by C. JOHNSTON.

December 15.—One hundred and thirtieth regular meeting. Professor Gildersleeve in the chair. Forty members present.

On the Dramatic Satura and the Old Comedy at Rome, by G. L. HENDRICKSON.
German Studies in America [1815–1825], by M. D. LEARNED.

January 19.—One hundred and thirty-first regular meeting. Professor Gildersleeve in the chair. Thirty-four members present.

On the Spanish of Mexico City, by C. C. MARDEN.
Trita, the Scape-Goat of the Gods, by M. BLOOMFIELD.

Historical and Political Science Association.

October (1893) *Meetings.*

The Congo Free State, by J. S. REEVES.
The Relation between the Roman and Early English Churches, by J. S. BASSETT.
"Maryland: its Resources, Industries and Institutions," by J. H. HOLLANDER.
Origin of the Idea of Proprietary Government in the Carolinas, by J. S. BASSETT.
The American Proportional-Representation League, by J. M. VINCENT.

November Meetings.

The Cincinnati Southern Railway; a Study in Municipal Activity, by J. H. HOLLANDER. (Published in the "Studies," *January and February*, 1894.)
College Settlements, by H. B. ADAMS.
History and Status of Negro Suffrage in the South, by S. B. WEEKS.
A Cure for the Gerrymander, by JOHN HAYNES.
Haym Salomon, by H. B. ADAMS.
In Memoriam: Lucius S. Merriam, by J. H. HOLLANDER and others. (Published in the "Studies," *January and February*, 1894.)

December 14.

Impressions of Alaska, by H. B. ADAMS.

January 4, 1894.

The Popularity of Boethius in the Middle Ages, by J. S. REEVES.
The Origins of the Bi-Cameral System in America, by T. F. MORAN.
Recent Japanese Educational Literature, by M. TAKAKI.
The Parkin Street Settlement in Baltimore, by F. D. THOMSON.
The Pratt Library and its Branches, by B. C. STEINER.

Physical Seminary.

October-December, 1893.

Weekly meetings to read and discuss J. J. Thomson's "Applications of Dynamics to Physics and Chemistry."
Electrical Discharge through Gases, by J. S. AMES.
Physical Theory of Hertz' Experiments, by E. S. FERRY.
Mechanical Theory of Chemical Phenomena, by A. M. MORRISON.

Mathematical Society.

Under the direction of Professor CRAIG.

FIRST SECTION.

The work in this Seminary was based primarily on Poincaré's two memoirs: Théorie des Groupes Fuchsiens; Sur les Fonctions Fuchsiennes.

October 11, 1893.—General Remarks on Discontinuous Groups of Transformations, by Professor CRAIG.
October 18.—Introductory Remarks Relative to Poincaré's Memoirs, by Professor CRAIG.
On the First Portion of Poincaré's Memoir on Fuchsian Groups, by A. COHEN.
October 25.—On Linear Entire Transformations with Determinant + 1, by J. H. TUDOR and T. H. TALIAFERRO.
November 1.—Report (in continuation) on Poincaré's Memoir, by E. P. MANNINO.
November 2.—On Congruent Figures, by W. H. MALTBIE.
November 8.—On Discontinuous Groups, by H. A. SAYRE.
November 15.—On Discontinuous Groups, by C. R. DUVALL and W. W. LANDIS.
November 22.—On Generating Polygons, by T. H. TALIAFERRO and J. H. TUDOR.
November 29.—On Fuchsian Groups of the First Family, the Second Example in Poincaré's Memoir, by C. R. DUVALL and T. H. TALIAFERRO.
December 6.—On Fuchsian Groups of the Second Family, First Order, the Third Example in Poincaré's Memoir, by J. H. TUDOR and H. A. SAYRE.
December 13.—Geometrical Proof of a Theorem in Linear Substitutions, by W. H. MALTBIE.
December 14.—On Fuchsian Groups of the Third Family, the First Example in Poincaré's Memoir, by W. H. MALTBIE and A. COHEN.
December 20.—Report on Portions of Poincaré's Memoir on Fuchsian Functions, by W. H. MALTBIE and A. COHEN.
January 3.—Weierstrass's Definition of a Monogenic Function, by H. A. SAYRE.

SECOND SECTION.

October 11.—Linear Substitutions, by A. COHEN.
October 18.—Periodic Continued Fractions, by C. R. DUVALL.
October 25.—The Hessian, by W. W. LANDIS.
The Series $\frac{1}{2 \log 2} + \frac{1}{3 \log 3} + \cdots\cdots + \frac{1}{n \log n}$, and a General Theorem by Abel in Divergent Series, by D. N. LEHMER.
November 1.—Application of a Formula of Kronecker's on Integration by Parts, by A. H. WILSON.
Quadratic Forms, by J. H. TUDOR.
November 8.—Dirichlet's Problem, by A. M. MORRISON.
November 15.—Dirichlet's Problem (in continuation of previous paper), by E. P. LEWIS.
November 22.—Surface Integrals, by E. H. ROBERTS.
November 29.—Plücker's Formulae, by J. S. MORRIS.
December 6.—Semi-Convergent Series, by C. C. SCHENCK.
Geometrical Proof of a Problem in Limits, by N. E. DORSEY.
December 13.—A Method by Kummer in Summation of Series, by S. M. BARTON.
December 20.—Theory of Attractions by R. WATTS and F. H. CLUTZ.
January 3.—Green's Theorem for Space, by E. S. FERRY.
January 10.—Determinants applied to Continued Fractions, by T. W. JOHNSON.

Astronomical Seminary and Journal Club.

Meetings held weekly from October 18–*January* 10, 1894.

Journal Reports, by C. L. POOR and S. V. HOFFMAN.
Observatories of Edinburg, Oxford and Cambridge, by F. H. CLUTZ.
Observatories of Kew and Greenwich, by E. H. JOHNSON.
Observatories of Potsdam and Berlin, by E. L. STONER.
Methods of General Perturbations, by B. M. ROSZEL.
Velocity of Light, by S. V. HOFFMAN.
Washington Observatory, by A. N. EDAUGH.

Baltimore Naturalists' Field Club.

November 14, 1893.—Election of Officers.
President: BASIL SOLLERS; *Vice-President:* B. W. BARTON; *Secretary:* C. E. WATERS; *Chairman Botanical Section:* J. P. LOTSY; *Chairman Zoölogical Section:* A. J. BIGNEY; *Chairman Geological Section:* R. M. BAGG.
Notes on the Horned Lark, by GEO. GRAY.
Notes on the Cœrulean Warbler, by J. H. PLEASANTS.
Our Native Orchids, by B. SOLLERS.
On the Cultivation of Our Native Orchids, by F. H. D. CRANE.
Greenhouse Orchids, by WM. MACROBERTS.

December 12.
On Earthworms, by GEO. GRAY.
Changes in the appearance of Wheat Fields and Lawns, by B. W. BARTON.
A list of Late Blooming Plants, by C. E. WATERS.
The Resting Period of Plants, by B. SOLLERS and B. W. BARTON.

January 9, 1894.
Notes on Cowbirds and late Insects, by GEO. GRAY.
Notes on a Land Planarian (Bipalium Kewense), by E. A. ANDREWS.
Paper on Vegetable Galls, by J. P. LOTSY.

Botanical Section of Field Club: J. P. LOTSY, *Chairman.*

December 19.—Organization Meeting.
Election of Secretary:—CORNELIUS BEATTY.

January 8.—
Life Histories of some Phanerogamous Parasites, by J. P. LOTSY.
Distribution of Seeds, by C. E. WATERS.

Young Men's Christian Association.

October 6, 1893.—Opening Reception.

October 23.—Conference of Committees at the home of Dr. James Carey Thomas.

October 24.—Meeting in the interests of Missions and Charities. Addresses were made by D. I. GREEN, Rev. E. A. LAWRENCE, President GILMAN and Professor LEARNED.

November 14.—Union service for the students of all professional schools in the City. Dr. JAMES CAREY THOMAS, Professor BARTON of Bryn Mawr, Professor JONES of Haverford, Mr. JOSHUA LEVERING and Mr. W. H. MORRISS spoke.

December 19.—Meeting addressed by Rev. W. H. SHEPHERD of the Congo Free State.

January 16, 1894.—Annual Meeting. Officers were elected as follows:—

President: M. D. LEARNED; *Vice-Presidents:* E. B. MATHEWS and C. E. WATERS; *Treasurer:* W. H. MALTBIE; *Recording Secretary:* JOHN W. R. SUMWALT; *Executive Council:* the OFFICERS and G. H. EMMOTT, C. W. BUMP, and G. C. MCKEE.

RECENT PUBLICATIONS.

The following list enumerates publications since January, 1893, by those who have been or are now members of this University. It is printed for the information of their colleagues and friends, and is not supposed to be complete. The last previous list is given in *University Circulars*, No. 102. Papers in the *University Circulars* and *Hospital Bulletins* are not here noted.

Adams, H. B. The Life and Writings of Jared Sparks. (*Boston, Houghton*, 1893. 2 *Vols. 8vo.*)

Adams, H. C. Review of Rogers' Industrial and Commercial History of England. (*Political Science Quarterly, March*, 1893.)

—— Transportation in the United States. (*Railway Age, January*, 1893.)

—— Introduction to Philanthropy and Social Progress. (*Boston*, 1893.)

—— Address on the Ministry of Wealth. (*Rockford Collegian, June*, 1893.)

—— Fifth Annual Report on Statistics of Railways in the United States to the Inter-State Commerce Commission; Preliminary Report on the Income Account of Railways for 1892; Report on Transportation Business in the Eleventh Census. (*Government Printing Office*, 1893.)

—— The Social Ministry of Wealth. (*International Journal of Ethics, January*, 1894.)

Adler, C. Jews in the American Plantations between 1600–1700; Americana at the Anglo-Jewish Exhibition; A Political Document of the year 1800. (*Publications of the American Jewish Historical Society, No.* I.)

Allen, E. T. The Reaction between Lead Dioxide and Potassium Permanganate.
Thesis for the Degree of Doctor of Philosophy.

Allinson, F. G. Review of Hatzidakis' Einleitung in die Neugriechische Grammatik. (*American Journal of Philology, XIV, No.* 1.)

Ames, J. S. The Work of Kayser and Runge on the Spectra of the Elements. (*Astronomy and Astro-Physics*, 1893.)

—— On the Probable Spectrum of Sulphur. (*Ib.*)

Andrews, C. M. Some Recent Aspects of Institutional Study. (*Yale Review, February*, 1893.)

Andrews, E. A. An Undescribed Acraniate: Asymmetron Lucayanum. With two plates. (*Studies from the Biological Laboratory*, 1893.)

Applegarth, A. C. Feeders of Crime. (*The Green Bag, February*, 1893.)

Applegarth, E. C. The Latent Time of the Knee Jerk.
Thesis for the Degree of Doctor of Philosophy.

Arnolt, W. M. Reports on Rheinisches Museum and on Journal Asiatique. (*American Journal of Philology, XIV, Nos.* 3 *and* 4.)

—— Semitic Words in Greek and Latin. (*Transactions of the American Philological Association*, 1892.)

—— The Babylonian Account of the Creation. (*The Biblical World, January*, 1894.)

Ayres, P. W. Experiments in Relief Work. (*The Charities Review, November*, 1892.)

—— The Charity Organization Movement. (*Bulletin of the Christian Social Union, June*, 1893.)

Ballard, H. H. The Action of Phenylhydrazine on the Chlorides of Ortho-sulpho-benzoic Acid.
Thesis for the Degree of Doctor of Philosophy.

Barton, B. W. On the Origin and Development of the Stichidia and Tetrasporangia in Dasya Elegans. (*Studies from the Biological Laboratory*, 1893.)

Bascom, F. The Structures, Origin, and Nomenclature of the Acid Volcanic Rocks of South Mountain. (*Journal of Geology, Nov.-Dec.*, 1893.)

Bassett, J. S. A North Carolina Monastery. (*Magazine of American History, February*, 1893.)

—— Southern Literature of the Past and of the Future; Immigration and Southern Progress. (*The Trinity Archive*, 1893.)

Bayley, W. S. Summary of Progress in Mineralogy and Petrography. (*Waterville, Me.*, 1893.)

Beeson, J. L A Study of the Action of Certain Diazo-Compounds on Methyl and Ethyl Alcohols.
Thesis for the Degree of Doctor of Philosophy.

Bemis, E. W. Discontent of the Farmer. (*The Journal of Political Economy, March*, 1893.)

—— Local Government in the South and the South-west. (*Studies in History and Politics*, 1893.)

—— Recent Results of Municipal Gas-Making in the United States. (*Review of Reviews, February*, 1893.)

Bentley, A. F. The Condition of the Western Farmer as illustrated by the Economic History of a Nebraska Township. (*Studies in History and Politics*, 1893.)

Berkley, H. J. The Cerebellar Cortex of the Dog. (*Johns Hopkins Hospital Reports, Vol. III, No.* 4–5–6.)

Bevan, W. L. Sir William Petty, sein Leben, etc. (*Inaugural Dissertation, Munich*, 1893.)

Billinos, J. S. The Effects of his Occupation upon the Physician. (*International Journal of Ethics, October*, 1893.)

—— The Population of the Earth. (*The Chautauquan, February*, 1893.)

Black, J. W. References on the History of Labor and some Contemporary Labor Problems. (*Oberlin College Library Bulletin, Vol. I, No.* 2.)

Blackmar, F. W. Penology in Kansas. (*Kansas University Quarterly, April*, 1893.)

Bloomfield, M. Review of Hillebrandt's Vedische Mythologie, I. (*American Journal of Philology, XIV, No.* 4.)

—— The Myth of Soma and the Eagle. (*Festgruss an Rudolf von Roth, Stuttgart*, 1893.)

Bolza, O. On Cole's Translation of Netto's Theory of Substitutions. (*Bulletin of the New York Mathematical Society, Vol. II, No.* 5.)

Bond, A. K. Some Nervous Effects of Gastric Disorders. (*Maryland Medical Journal, December* 23, 1893.)

—— The Present Status of Drug Therapeutics as Applied by the General Practitioner. (*Ib., Sept.* 23, 1893.)

Botsford, G. W. The Development of the Earlier Athenian Constitution. (*Ginn & Co., Boston*, 1893.)

Bowen, B. L. Review of Keene's Literature of France. (*Modern Language Notes, January*, 1893.)

Bowen, E. W. An Historical Study of the ĕ-Vowel in Accented Syllables in English.
Thesis for the Degree of Doctor of Philosophy.

Branson, D. C. The Temptation of Culture. (*The Trinity Archive, May*, 1893.)

Bright, J. W. The Gospel of St. Luke in Anglo-Saxon. (*Clarendon Press, Oxford*, 1893.)

Brooks, W. K. The Genus Salpa: A Monograph with 57 plates and 396 pages, large 4to. (*Baltimore*, 1893.)

—— Salpa in its relation to the Evolution of Life. (*Studies from the Biological Laboratory*, 1893.)

—— Aspects of Nature in the West Indies. (*Scribner's Magazine, July*, 1893.)

—— Maryland Fish and Fisheries; The Oyster. (*Maryland World's Fair Book*, 1893.)

—— The Origin of the Food of Marine Animals. (*A Paper read at the Chicago Fisheries Congress.*)

Browne, W. H. (*Editor*). Archives of Maryland: Journal and Correspondence of the Maryland Council of Safety, July 7 to December 31, 1776. (*Maryland Historical Society*, 1893.)

—— Historical Sketch of Maryland. (*Maryland World's Fair Book*, 1893.)

—— Anemonae Verborum. (*Modern Language Notes, January*, 1894.)

Bruce, J. D. Immediate and Ultimate Source of the Rubrics and Introductions to the Psalms in the Paris Psalter. (*Modern Language Notes, February*, 1893.)

Bruner, J. D. Manuscripts in the Pistojese Dialect. (*Modern Language Notes, April*, 1893.)

—— The Tonic Personal Pronoun *tu* > *tue* > *tuo* in Old Pistojese. (*Ib., February*, 1893.)

Bump, C. W. Churches and Religious Institutions of Maryland. (*Maryland World's Fair Book*, 1893.)

Burt, B. C. History of Modern Philosophy. (*Chicago*, 1893.)

Cajori, F. On the Multiplication of Semi-convergent Series. (*American Journal of Mathematics, October*, 1893.)

Carpenter, W. H. Review of Wright's Primer of the Gothic Language. (*Educational Review*, 1893.)

Carver, T. N. The Science of Demagogy. (*The American Journal of Politics, March*, 1893.)

Cary, A. A Study in Foot Structure. (*Journal of Morphology, December*, 1892.)

Chapman, C. H. The Theory of Transformation Groups. (*Bulletin of New York Mathematical Society*, 1893.)

Child, C. G. Review of the Stanford Dictionary of Anglicised Words and Phrases. (*Modern Language Notes, April*, 1893.)

—— Stapol = Patronus. (*Ib., December*, 1893.)

Clark, W. B. The Mesozoic Echinodermata of the United States. (*U. S. Geol. Survey, Bulletin* 97, 1893).

—— The Surface Configuration of Maryland; The Leading Features of of the Climate; The Available Water-power; Public Water Supply. (*Monthly Reports, Maryland State Weather Service*, 1893.)

—— The Climatology and Physical Features of Maryland; Directors' Report and other articles. (*First Biennial Report, Maryland State Weather Service, for* 1892 *and* 1893.)

—— Certain Climatic Features of Maryland. (*American Journal of Meteorology, February*, 1894.)

—— The Origin and Classification of the Greensands of New Jersey. (*Journal of Geology, February*, 1894.)

—— A Preliminary Report on the Cretaceous and Tertiary Formations of New Jersey. (*Annual Report of the State Geologist for* 1892.)

—— and G. H. Williams. Geology and Physical Features of Maryland. (*Maryland World's Fair Book*, 1893; *reprinted by Johns Hopkins Press*, 1893.)

—— (with C. P. Cronk and M. Whitney). Climatic Charts of Maryland (1893).

Coar, H. L. Double Surfaces. (*Science, December,* 1893.)

Commons, J. R. The Church and the Problem of Poverty in Cities. (*The Charities Review, May,* 1893.)

—— The Distribution of Wealth. (*New York, Macmillan,* 1893.)

—— A Bibliography of Proportional Representation. (*The Proportional Representation Review, December,* 1893.)

Conn, H. W. Bacteria in the Dairy. (*From Annual Report of Storrs Agricultural Experiment Station,* 1892.)

Cook, A. S. Report on Englische Studien. (*American Journal of Philology, XIV, No.* 1.)

Councilman, W. T. A Case of Chronic Nephritis in a Cow. (*Johns Hopkins Hospital Reports, Vol. III, No.* 4–5–6.)

—— The Pathological Department of the Harvard Medical School. (*Bulletin, Harvard Medical School Association, May,* 1893.)

Craig, T. Note on Monogenic Functions of a Single Variable; Review of Picard's Traité d'Analyse; Some of the Developments in the Theory of Ordinary Differential Equations between 1878 and 1893. (*Bulletin of N. Y. Mathematical Society,* 1893.)

—— Review of Greenhill's Applications of Elliptic Functions. (*Journal of the United States Artillery, April,* 1893.)

Crawford, A. C. (*See Friedenwald, H.*)

Crehore, A. C. (and another). A Geometrical Proof of the Three-Ammeter Method of Measuring Power. (*The Physical Review, Vol. I, No.* 1.)

Crew, H. Concave Grating for the Study of Stellar Spectra. (*Astronomy and Astro-Physics, February,* 1893.)

Cronk, C. P. Climatology of Maryland. (*First Biennial Report, Maryland State Weather Service,* 1893.)

Daniel, J. A Study of the Polarization upon a Thin Metal Partition in a Voltameter. I. (*The Physical Review, January-February,* 1894.)

—— A Study in Polarization—Preliminary Note. (*Science, June* 23, 1893.)

Dashiell, P. J. Paraethoxyorthotoluene Sulphonic Acid and Some of its Derivatives. (*American Chemical Journal, Vol. XV,* 2.)

—— (See also Remsen, I.)

Day, D. T. Mineral Resources of the United States. (*U. S. Geological Survey, Washington,* 1893.)

Dewey, D. R. Statistics of Suicides in New England. (*American Statistical Association,* 1892.)

Dewey, J. Teaching Ethics in the High School. (*Educational Review, November,* 1893.)

—— Self-Realization as the Moral Idea; Green's Theory of the Moral Motive; Review of Bosanquet's History of Aesthetics. (*Philosophical Review,* 1893.)

—— The Superstition of Necessity. (*Monist, April,* 1893.)

—— Renan's Loss of Faith in Science. (*The Open Court,* 1893.)

Dreyer, G. P. The Effects of Hemorrhage and of Fasting on the Proteids of the Blood of Cats. (*Studies from the Biological Laboratory, Vol. V, No.* 2.)
Thesis for the Degree of Doctor of Philosophy.

—— Also see H. N. Martin.

Earle, S. T. A Case of Incomplete and Imperforate Rectum. (*Maryland Medical Journal,* 1893.)

Edwards, C. L. The Marine Biological Station of the University of Texas. (*Science,* 1893.)

Elliott, A. M. Modern Language as a College Discipline. (*Heath, Boston,* 1893.)

Elmer, H. C. On Horace, Sat. 1, 10, 21. (*Transactions, American Philological Association,* 1892.)

Ely, R. T. Outlines of Economics. (*N. Y.,* 1893.)

Fairclough, H. R. The Private Correspondence of Lieut. Col. Coffin, during the Rebellion of 1837. (*Transactions of the Canadian Institute, Vol. III.*)

Fay, E. A. Report of the Committee on Classification of Methods of Instructing the Deaf. (*Washington,* 1893.)

Fay, E. W. Etymological Notes. (*Transactions of American Philological Association for* 1892.)

Ferren, H. M. Review of Wunderlich's Der deutsche Satzbau. (*American Journal of Philology, XIV, No.* 4.)

Field, G. W. The Larva of Asterias Vulgaris.
Thesis for Degree of Doctor of Philosophy.

Finley, J. H. A New Phase of University Extension. (*University Extension, November,* 1893.)

—— American Charity Movements; How Not to Help the Poor. (*The Chautauquan, October,* 1893; *February,* 1894.)

Finley, J. P. Certain Climatic Features of the Two Dakotas. (*Washington,* 1893.)

Finley, R. J. Electric Street-Lighting in American Cities. (*Review of Reviews, February,* 1893.)

Flexner, S. Multiple Lympho-Sarcomata, with a Report of Two Cases. (*Johns Hopkins Hospital Reports, Vol. III.*)

Fontaine, J. A. Reviews of Fontaine's Les Prosateurs Français du XIX Siècle; of Castegnier's Extraits Choisis des Oeuvres de François Coppée; of Kitchin's Episodes from the Comte de Monte Cristo; of Sharp's Souvenirs des Cent Jours; of Boielle's Quatrevingt Treize. (*Modern Language Notes,* 1893, 1894.)

Fowler, H. N. The Temple of the Acropolis Burnt by the Persians. (*Am. Journal of Archaeology, January-March,* 1893.)

Franklin, C. L. A New Theory of Light Sensation. (*International Congress of Experimental Psychology, London,* 1892.)

—— Intuition and Reason. (*Monist, January,* 1893.)

—— Color Vision. (*Science, September,* 1893.)

—— On Theories of Light Sensation. (*Mind, October,* 1893.)

—— Prof. Ebbinghaus' Theory of Color Vision. (*Mind, January,* 1894.)

Friedenwald, Harry. Cholesteatoma of the Ear. (*Medical News, March* 11, 1893.)

—— Cranial Deformity and Optic Nerve Atrophy. (*American Journal of Medical Sciences, May,* 1893.)

—— The Causation of Inflammation. A Review. (*N. Y. Medical Journal, July* 8, 1893.)

—— The Interrupted Blood Column in the Vessels of the Eye. (*Ophthalmic Review, London, June,* 1893.)

—— Ueber die durch corrigirende Gläser hervorgerufene binoculare Metamorphopsie. (*Archiv für Augenheilkunde,* 1893.)

—— and A. C. Crawford. Calomel Conjunctivitis. (*Journal of Ophthalmology,* 1893.)

—— Movements of the Upper Eyelid associated with lateral movements of the Eyeball. (*Ib.*)

Friedenwald, Herbert. Jews mentioned in the Journal of the Continental Congress. (*Am. Jewish Historical Society, Publications, No.* 1.)

Friedenwald, J. Pettenkofer and the Cholera Question; Electric Illumination of the Stomach. (*Maryland Medical Journal,* 1893, 1894.)

—— Atony of the Stomach. (*Medical News, December* 23, 1893.)

—— Review of the More Important Methods for the Quantitative Determination of the Hydrochloric Acid of the Gastric Juice; Diazo Reaction of Ehrlich. (*N. Y. Medical Journal,* 1893.)

Frothingham, A. L., Jr. Notes on Roman Artists of the Middle Ages. (*Am. Journal of Archaeology, Vol. VIII.*)

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